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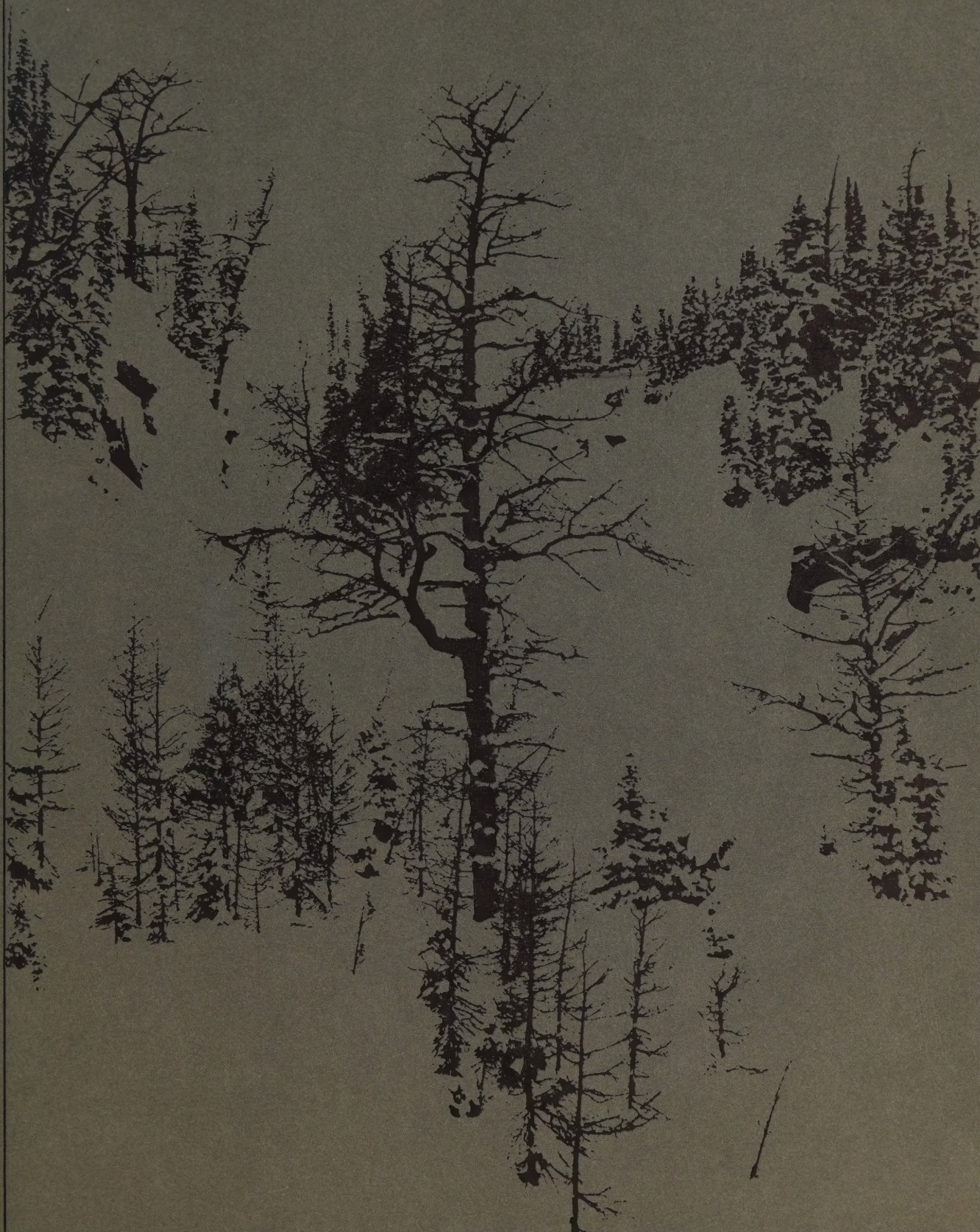
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Human Activity and the Environment



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HUMAN ACTIVITY AND THE ENVIRONMENT

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PREFACE

This publication presents statistical series detailing human activities which have a potential for imposing stress on the natural environment. Although many of the data have previously been published by Statistics Canada, they are presented here for the first time within a thematic framework related to the environment. The organization of information according to watersheds of Canada, for example, presents these statistics in a new light.

This report was prepared in the Office of the Senior Adviser on Integration, primarily by A.M. Friend, L.L. Kaplansky and B.W. Mitchell.

Considerable assistance was obtained from other groups in Statistics Canada and other federal government departments. This help is gratefully acknowledged, with special thanks to the Drafting Unit of the Water Resources Branch, Inland Waters Directorate, Fisheries and Environment Canada.

Comments on this report are welcome and should be addressed to H.J. Adler, Senior Adviser on Integration.

PETER G. KIRKHAM,
Chief Statistician of Canada.

SYMBOLS

The following standard symbols are used in Statistics Canada publications:

- . . figures not available.
- . . . figures not appropriate or not applicable.
- nil or zero.
- - amount too small to be expressed.
- P preliminary figures.
- r revised figures.
- x confidential to meet secrecy requirements of the Statistics Act.

NOTE

In some tables, figures will not add to totals, because of rounding.

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INTRODUCTION

*Getting and spending, we lay waste our powers:
Little we see in Nature that is ours;
We have given our hearts away, a sordid boon!*

William Wordsworth, 1770 - 1850

The Romantic poets decried the sordid environment created by the process of industrialization. These sentiments were dismissed as too pessimistic in an age of scientific and technological progress. The traditional bounds which limited man's productive capacity appeared to be steadily expanding and it did not appear that this process would stop short of fulfillment of all the material needs of mankind — the Malthusian warning notwithstanding.

As the Malthusian warning seems to approach reality for the economically impoverished and densely populated countries, other limits to conventional economic growth patterns appear on the horizon for the industrialized countries. These limits are imposed by the environmental transformations effected by man's activities as producer, consumer and accumulator.

Canadians are becoming increasingly concerned about the risks to human health and to natural ecosystems as a result of environmental contamination and other man-caused stresses. That human activities can drastically alter the suitability of landscapes for human existence is a fact that has been recorded since ancient times. Today the scope and scale of these transformations has increased markedly. As the amount of wilderness area decreases at an increasingly rapid rate, man no longer has the ready option to become a fugitive species, to escape to a new continent, as in centuries past. Having run out of new parts of the planet to colonize, we are now forced to turn our attention to maintaining the quality of the present environment to ensure the survival of future generations.

The degree of stress placed on natural communities as a result of human activities would appear to be a function of the size of the human population, the sophistication and use of its technology and the degree of environmental awareness.

It is the purpose of this publication to outline certain classes of human activity which produce stress on the natural environment. Hopefully, the availability of this information will allow further analysis by others, improving our understanding of man's impact on the environment. A necessary foundation for such analysis may be found in the quantitative description of human activities which act potentially as environmental stress generators.

In this publication, several major categories of "man-caused" stressors have been selected and examined

on the basis of their presumed importance in effecting environmental transformations. A major criterion was that most of these data be available from Statistics Canada sources, in effect making this in part an attempt to synthesize much of this department's available information pertaining to the environment.

Over the years, Statistics Canada has collected and compiled data in many areas which have some bearing on the question of environmental transformation. It was felt that many of these data could contribute to the understanding of some of the underlying relations between man-made activity and stress on the environment. Naturally and it is quite evident from the statistics compiled for this publication, the available data were collected for other purposes; nevertheless, selecting and recasting the information with an environmental perspective in mind can contribute to the improvement of at least one component of a comprehensive description of the environment and its related dynamics.

The statistics are not intended to show deterioration (or improvement) of the quality of the environment. Data of this kind, referred to as "response" data, are now being developed by the Department of Fisheries and the Environment. At some future date, it would be useful to correlate "stress" data of the type employed in this book with "response" data.

Some Comments on the Data

The reader will discern a somewhat uneven presentation of data. There is, for example, greater detail in the series on population and agricultural characteristics by watershed than in other series. The novelty of the information made this worthwhile. In the energy chapter, some new (and somewhat complex) statistical information has been introduced. Most of the remaining data are summaries of already published series, although some are from sources other than Statistics Canada. These latter series are included primarily to complement Statistics Canada data; however, due to resource constraints, the process of choice was of necessity somewhat eclectic in the face of the large and growing body of statistics relevant to the environment that is produced outside the department.

Highlights

Watersheds

National data, when disaggregated, are usually presented according to provinces, municipalities and

other political entities. Using the concept of natural statistical areas,¹ this chapter divides Canada into a manageable number of watersheds and presents data, particularly population characteristics, for those areas. Maps and a coding system are included to aid the reader. Watershed information may also be found in the chapters on agriculture and manufacturing.

Renewable Resources

This topic is covered in the chapters dealing with agriculture, forestry and fisheries. Abundant data exist for agriculture and forestry; however, there is less information on fisheries. Significant data gaps that do exist have been identified in the chapter introductions. Some manipulation of data was carried out to obtain indicators of technological change in agriculture and the depletion of forest resources. The competition between urban and agriculture uses for land in good growing areas is illustrated in chart form and through the use of airphotos.

Transportation

The transportation chapter presents information that will allow an assessment of the amount of environmental stress imposed by transportation related factors, including network mileages, vehicle stocks and the movement of goods and passengers. Data on less visible but environmentally significant networks such as oil and gas pipelines and electric power corridors are also included. The spatial distribution of major electric power lines and roads and highways is illustrated in map form.

Manufacturing

In this chapter, attention is focussed on the transformation processes. The first set of tables examines

manufacturing activity in terms of number of establishments, production workers, value added and fuel and water use, with manufacturing industries grouped into high-, medium- and low-stressor categories. A second set of tables contains data from claims for pollution abatement equipment and its installation under the Accelerated Capital Cost Allowance Program (ACCA). Selected inputs and products of the manufacturing industry that have high environmental impact form the basis for a third set of tables.

Energy

The final chapter covers various aspects of energy supply and use and emphasizes changes in energy sources and consumption. All the quantities of fuels and electricity have been converted to British Thermal Units (B.t.u.'s) as a basis for comparing equivalent heat content regardless of source.

The chapter concludes with a set of statistics on the production, use and reserves of petroleum and natural gas. Other data on energy use may be found in the chapters on agriculture and transportation, where information concerning the rapid growth of energy transportation networks is provided.

Appendices

Appendices 1 - 9 contain the detailed watershed tables on agriculture, household water sources and sewage disposal facilities, and manufacturing activity. Also included is an explanation of how the watersheds were delineated and how the population census and manufacturing data were retrieved with respect to these watersheds.

¹ For an explanation of how these areas were arrived at, see Appendix 1.

CHAPTER I

WATERSHEDS

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- 1.2. The Hudson Bay and Arctic Drainage Basins.
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- 1.5. Population of Selected Watersheds Which Contain Census Metropolitan Areas (CMA's) and Other Large Cities, 1971.
- 1.6. Watersheds with High Population Densities, 1971.

WATERSHEDS

In recent years, the demand for socio-economic data by natural spatial units, as opposed to those defined by administrative and political boundaries, has been growing. Conceptually, the watershed is reasonably simple to construct because its boundaries — heights of land — are well defined.

The actual number of watersheds in Canada, however, is far greater than the number that can be properly displayed, hence there is a need to aggregate watersheds at various levels. The aggregation process also includes two basic factors: first, river basins have a natural hierarchical base for classification; and second, the density of population and the intensity of economic activity vary greatly by location. Thus, in the more densely populated parts of the country, river basins are more finely differentiated than in the lightly or unpopulated regions.

The coding system used is such that the specified watersheds can be aggregated up to the level of the five Canadian drainage basins. There are three levels of aggregation: the specific watershed receives a three-digit code; a natural grouping of watersheds, a two-digit code and the five drainage basins are each given a one digit code. In addition, watersheds which cross provincial boundaries have been split into their provincial parts. For example, the Qu'Appelle River (241), with a Manitoba part (241 - 46) and a Saskatchewan part (241 - 47), is a sub-division of the Assiniboine grouping (24), which is a component of the Hudson Bay Drainage Basin (2).

Another approach, the presentation of data for biomes, was also examined. This work, however, was not completed in time for inclusion in this publication, though it is hoped that the socio-economic data base by biomes can be made available in the future.

Data

The following tables, as well as those in the other chapters of the publication, are examples of data which have the potential to be related to natural areas. Only those data with some bearing on water use or quality were selected. Census of Population and Census of Manufactures data are collected and coded geographically and, therefore, can be organized and retrieved with respect to delineated areas. A more detailed explanation of how this was done is found in Appendix 1.

The tables are summary population statistics from the 1971 Census of Canada for some of the more heavily populated watersheds. It will probably be possible to present data from future censuses in terms of these watersheds; unfortunately, however, historical data cannot be shown this way.

It should be noted that the areal measures of the sheds were calculated using a different method than was used for retrieving the other data. The areal measurements are approximations only and should be used more as relative indicators of size than as absolute measures. The data related to population, water and sewerage facilities for households, agriculture and manufacturing establishments, for all the watersheds, can be found in Appendices 3-6. Summary tables of these data are provided in the relevant chapters.

Watershed Code and Provincial Code

1. Atlantic Basin
 10. Atlantic Ocean
 - 100 - 10 Labrador
 - 101 - 10 North Coast Newfoundland
 - 102 - 10 Trinity Bay
 - 103 - 10 St. John's
 - 104 - 12 South Coast Nova Scotia
 11. Gulf of St. Lawrence
 - 110 North Coast Mainland:
 - 110 - 10 Labrador
 - 110 - 24 Quebec
 - 111 - 10 West and South Coast Newfoundland
 - 112 - 24 North Gaspé Peninsula
 - 113 West Coast Mainland:
 - 113 - 12 Nova Scotia
 - 113 - 13 New Brunswick
 - 113 - 24 Quebec
 - 114 - 11 Prince Edward Island
 - 115 - 12 Cape Breton Island
 12. Bay of Fundy
 - 120 - 12 Nova Scotia part
 - 121 - 13 New Brunswick part
 13. Saint John River
 - 130 Saint John River:
 - 130 - 13 New Brunswick part
 - 130 - 24 Quebec part
 14. St. Lawrence River
 - 140 - 24 Saguenay River
 - 141 - 24 Québec City
 - 142 - 24 Chaudière River
 - 143 - 24 St. Maurice River
 - 144 - 24 Eastern Townships
 - 145 - 24 Eastern Laurentians
 - 146 - 24 Montréal
 - 147 West St. Lawrence:
 - 147 - 24 Quebec part
 - 147 - 35 Ontario part
 15. Ottawa River
 - 150 Lower Ottawa:
 - 150 - 24 Quebec part
 - 150 - 35 Ontario part
 - 151 Upper Ottawa:
 - 151 - 24 Quebec part
 - 151 - 35 Ontario part
 16. Lake Ontario
 - 160 - 35 Belleville
 - 161 - 35 Trent System
 - 162 - 35 Oshawa-Colborne
 - 163 - 35 Toronto
 - 164 - 35 Hamilton
 - 165 - 35 Niagara Peninsula
 17. Lake Erie and Lake St. Clair
 - 170 - 35 Grand River
 - 171 - 35 Erie Shoreline
 - 172 - 35 Thames River
 - 173 - 35 Sydenham River
 18. Lake Huron
 - 180 - 35 South Huron
 - 181 - 35 Georgian Bay-Lake Simcoe
 - 182 - 35 North Huron
 19. Lake Superior
 - 190 - 35 Lake Superior
2. Hudson Bay and Ungava Basin
 20. East plus Ungava
 - 200 - 24 East plus Ungava
 21. South and West
 - 210 South and Southwest:
 - 210 - 24 Quebec part
 - 210 - 35 Ontario part
 - 210 - 46 Manitoba part
 - 211 North of Nelson River:
 - 211 - 46 Manitoba part including Churchill
 - 211 - 47 Saskatchewan part
 - 211 - 48 Alberta part
 - 211 - 61 Northwest Territories part
 22. Nelson River
 - 220 - 46 Nelson River
 23. Lake Winnipeg
 - 230 Lake Winnipeg:
 - 230 - 35 Lake of the Woods (Ontario)
 - 230 - 46 Lake Winnipeg Shoreline (Manitoba)
 - 231 - 46 Red River
 - 232 Dauphin:
 - 232 - 46 Manitoba part
 - 232 - 47 Saskatchewan part
 24. Assiniboine River
 - 240 Assiniboine and Souris:
 - 240 - 46 Manitoba part
 - 240 - 47 Saskatchewan part
 - 241 Qu'Appelle River:
 - 241 - 46 Manitoba part
 - 241 - 47 Saskatchewan part
 25. Saskatchewan River
 - 250 Saskatchewan River:
 - 250 - 46 Manitoba part
 - 250 - 47 Saskatchewan part
 - 251 - 48 Upper North Saskatchewan (above Edmonton)
 - 252 Lower North Saskatchewan:
 - 252 - 47 Saskatchewan part
 - 252 - 48 Alberta part
 - 253 South Saskatchewan and Red Deer:
 - 253 - 47 Saskatchewan part
 - 253 - 48 Alberta part
 - 254 - 48 Bow River
3. Arctic Basin
 30. Mackenzie River
 - 300 Mackenzie River:
 - 300 - 47 Saskatchewan part

Watershed Code and Provincial Code — Concluded

3. Arctic Basin — Concluded:

30. Mackenzie River — Concluded:

- 300 - 48 Alberta part
- 300 - 59 British Columbia part
- 300 - 60 Yukon part
- 300 - 61 Northwest Territories part

31. Athabasca River

- 310 Athabasca River:
- 310 - 47 Saskatchewan part
- 310 - 59 Alberta part

32. Peace River

- 320 Peace River:
- 320 - 48 Alberta part
- 320 - 59 British Columbia part

33. Arctic Ocean

- 330 - 61 Arctic Ocean (Arctic Islands and North Shore Northwest Territories)

4. Pacific Basin

40. Columbia River

- 400 - 59 Columbia River
- 401 - 59 Okanagan River
- 402 - 59 Similkameen River

41. Fraser River

- 410 - 59 Upper Fraser River
- 411 - 59 Thompson River
- 412 - 59 Lower Fraser River (Vancouver)

42. Yukon River

- 420 Yukon River:
- 420 - 59 British Columbia part
- 420 - 60 Yukon part

43. West Coast

- 430 Alsek River:
- 430 - 59 British Columbia part
- 430 - 60 Yukon part
- 431 - 59 Northern Coast
- 432 - 59 Southern Coast
- 433 - 59 South Vancouver Island (Victoria)
- 434 - 59 Skagit River

5. Gulf of Mexico Basin

50. Gulf of Mexico Basin:

- 500 Gulf of Mexico Basin:
- 500 - 47 Saskatchewan part
- 500 - 48 Alberta part

Map — 1.1

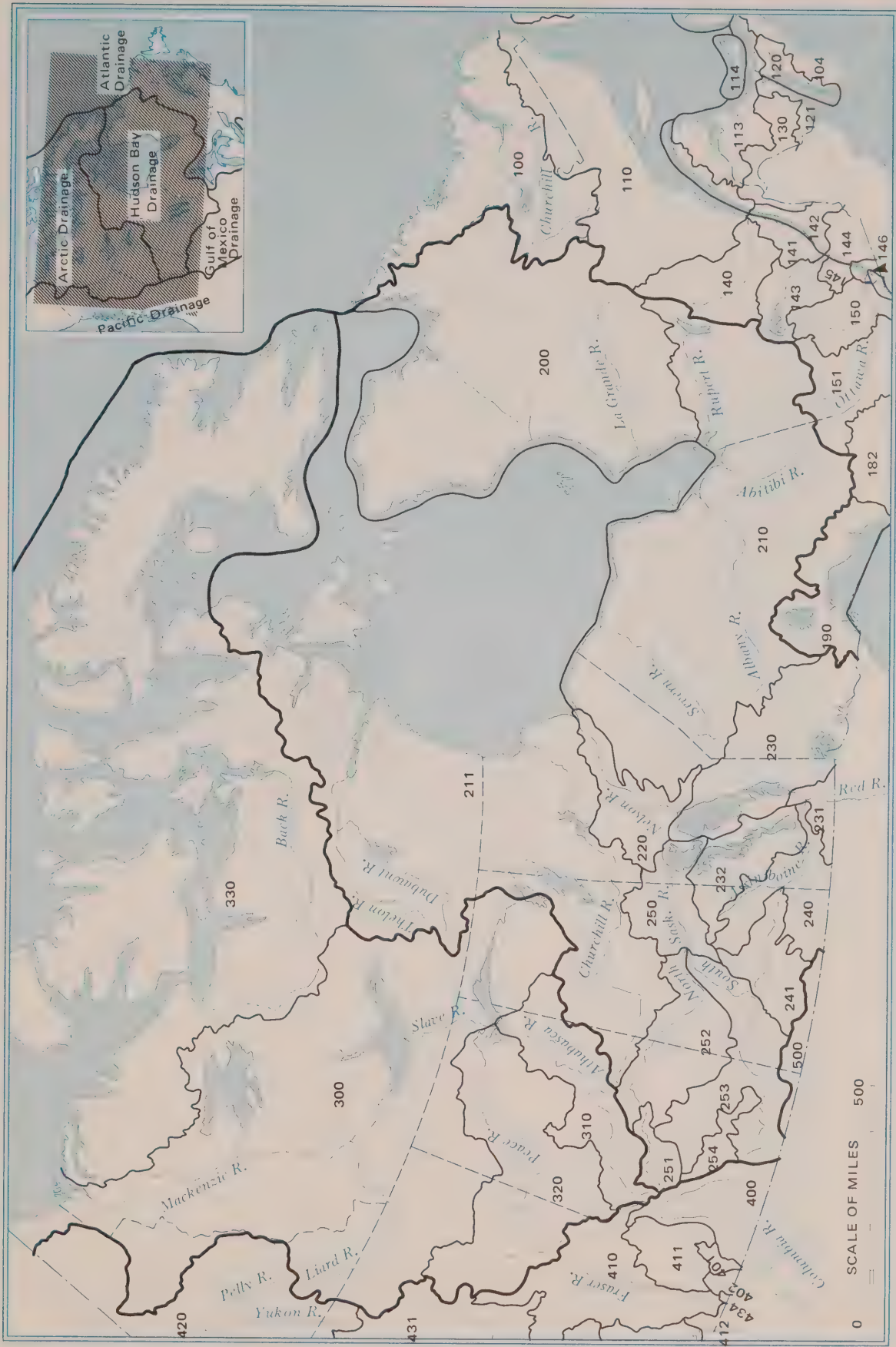
The Atlantic Drainage Basin



Source: Based on information from a series of Hydrographic Maps, Water Resources Branch, Fisheries and Environment Canada and unpublished information from Statistics Canada.

Map — 1.2

The Hudson Bay and Arctic Drainage Basins



Source: Same as in Map 1.1.

Map — 1.3
The Pacific Drainage Basin



Source: Same as in Map 1.1.

TABLE 1.4. Population, Area and Density for Drainage Basins and Primary Watersheds, 1971

| Watershed | Code | Population | Area ¹ square miles | Population density persons per square mile |
|---|---------------|------------|-----------------------------------|---|
| Atlantic Basin | 1 | 15,481,700 | 510,991 | 30.3 |
| Atlantic Ocean | 10 | 716,275 | 131,627 | 5.4 |
| Gulf of St. Lawrence | 11 | 1,089,635 | 124,671 | 8.7 |
| St. Lawrence River | 14 | 5,276,660 | 82,909 | 63.6 |
| Ottawa River | 15 | 1,178,150 | 57,977 | 20.3 |
| Lake Ontario | 16 | 3,981,490 | 12,273 | 324.4 |
| Lake Erie and Lake St. Clair | 17 | 1,472,295 | 9,394 | 156.7 |
| Lake Huron | 18 | 966,330 | 36,549 | 26.4 |
| Lake Superior | 19 | 150,340 | 30,972 | 4.9 |
| St. Lawrence River and Great Lakes ² | 14 - 19 | 13,025,265 | 230,074 | 56.6 |
| Hudson Bay and Ungava Basin | 2 | 3,669,060 | 1,335,650 | 2.7 |
| Nelson River | 220 | 30,315 | 34,435 | 0.9 |
| Lake Winnipeg | 23 - 25 | 3,336,175 | 328,067 | 10.2 |
| Arctic Basin | 3 | ... | ... | ... |
| Mackenzie River | 300, 310, 320 | 240,945 | 650,458 | 0.4 |
| Pacific Basin | 4 | 2,153,125 | 381,714 | 5.6 |
| Columbia River | 40 | 252,030 | 39,685 | 6.4 |
| Fraser River | 41 | 1,261,595 | 89,693 | 14.1 |
| Gulf of Mexico Basin | 5 | 13,825 | 9,905 | 1.4 |

¹ The areas are approximate and should only be used as relative indicators of size.

² These are figures for the Canadian portion of the Great Lakes Basin only. The following are population figures for the American portions of those basins in 1970: Lake Ontario, 2,898,485; Lake Erie, 10,111,571; Lake Huron, 1,390,880; Lake Superior, 429,033; and Lake Michigan, 10,566,266.

Source: Special tabulation by the Census Field, Statistics Canada; *Population Estimates for the Great Lakes Basins and their Major Tributaries*, Canada Centre for Inland Waters, Environment Canada, Burlington, Ontario, 1973.

TABLE 1.5. Populations of Selected Watersheds Which Contain Census Metropolitan Areas (CMA's) and Other Large Cities, 1971

| Watershed | Code | Total population | Area | Population density | City, CA or CMA | City, CA or CMA population |
|---|-------------|------------------|--------------|-------------------------|---|----------------------------|
| | | | square miles | persons per square mile | | |
| Saint John River | 130 | 337,080 | 14,542 | 23.2 | Saint John, CMA | 106,744 |
| St. Lawrence River | 14 | 5,276,660 | 82,909 | 63.6 | Québec, CMA | 480,502 |
| | | | | | Trois Rivières, CA | 97,930 |
| | | | | | Montréal, CMA | 2,743,208 |
| | | | | | Valleyfield, CA | 37,430 |
| | | | | | Cornwall | 47,116 |
| | | | | | Kingston, CA | 85,877 |
| Saguenay River | 140 | 267,400 | 34,022 | 7.9 | Chicoutimi - Jonquière, CMA | 133,703 |
| St. Maurice River | 143 | 183,510 | 17,536 | 10.5 | Shawinigan, CA | 57,246 |
| Ottawa River | 15 | 1,178,150 | 57,977 | 20.3 | Ottawa - Hull, CMA | 602,510 |
| Lake Ontario | 16 | 3,981,490 | 12,273 | 324.4 | Oshawa, CA | 120,318 |
| | | | | | Toronto, CMA | 2,628,043 |
| | | | | | Hamilton, CMA | 498,523 |
| Trent System | 161 | 193,760 | 5,198 | 37.3 | Peterborough, CA | 63,531 |
| Niagara Peninsula | 165 | 389,775 | 1,268 | 307.4 | St. Catharines - Niagara, CMA | 303,429 |
| Lake Erie and Lake St. Clair | 17 | 1,472,295 | 9,394 | 156.7 | Windsor, CMA | 258,643 |
| Grand River | 170 | 489,875 | 2,999 | 163.3 | Kitchener - Waterloo, CMA | 226,846 |
| | | | | | Brantford, CA | 80,284 |
| Thames River | 172 | 426,045 | 2,318 | 183.8 | London, CMA | 286,011 |
| Lake Huron | 18 | 966,330 | 36,549 | 26.4 | Sarnia, CA | 78,444 |
| Lake Winnipeg | 23 | 625,845 | 108,453 | 6.0 | | |
| Red River and Assiniboine River | 231 and 24 | 1,247,085 | 72,267 | 17.0 | Winnipeg, CMA | 540,262 |
| | | | | | Regina, CMA | 140,734 |
| Saskatchewan River | 25 | 1,870,510 | 157,344 | 11.9 | Edmonton, CMA | 495,702 |
| South Saskatchewan River | 253 and 254 | 952,275 | 68,769 | 13.8 | Saskatoon, CMA | 126,449 |
| | | | | | Lethbridge | 41,217 |
| | | | | | Calgary, CMA | 403,319 |
| | | | | | Red Deer | 27,674 |
| Columbia River | 40 | 252,030 | 39,685 | 6.4 | | |
| Okanagan River | 401 | 113,160 | 3,262 | 34.7 | | |
| Fraser River | 41 | 1,261,595 | 89,693 | 14.1 | Prince George, CA | 49,100 |
| | | | | | Vancouver, CMA | 1,082,352 |
| Thompson River | 411 | 100,820 | 21,685 | 4.6 | Kamloops, CA | 43,790 |

Source: Same as in Table 1.4.

TABLE 1.6. Watersheds with High Population Densities, 1971

| Watershed | Code | Population | Area | Population density |
|---|----------|------------|--------------|-------------------------|
| | | | square miles | persons per square mile |
| Toronto ¹ | 163 - 35 | 2,434,505 | 1,203 | 2,023.7 |
| Montréal ¹ | 146 - 24 | 2,667,375 | 1,926 | 1,384.9 |
| Hamilton ¹ | 164 - 35 | 630,530 | 996 | 633.1 |
| Lower Fraser River | 412 - 59 | 1,007,420 | 2,389 | 421.7 |
| Niagara Peninsula | 165 - 35 | 389,775 | 1,268 | 307.4 |
| Thames River | 172 - 35 | 426,045 | 2,318 | 183.8 |
| Grand River | 170 - 35 | 489,875 | 2,999 | 163.3 |
| West St. Lawrence (Quebec part) | 147 - 24 | 64,010 | 395 | 162.1 |
| Lower Ottawa (Ontario part) | 150 - 35 | 479,175 | 3,700 | 129.5 |

¹ These sheds are constructed to enclose an urban area and may contain a number of small river basins.

Source: Same as in Table 1.4.

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AGRICULTURE

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AGRICULTURE

Traditional agriculture, from the perspective of material transformation, is the extension of the natural process in which energy is obtained from solar radiation and transformed through the process of photosynthesis into biological matter. Livestock production is a secondary natural process in which the energy is obtained from the solar energy contained (trapped) in the plants consumed. In traditional agriculture, part of this "secondary energy source" (work animals) was utilized in ploughing, harvesting and carrying materials and people. Thus, there was little need for energy from outside sources. Similarly, the cycle of sustained yields, i.e., upkeep of soil quality, was maintained by "recycling" nutrient matter and by crop rotation. Man's intervention in this natural process consisted primarily of the elimination of the undesired, and selection of the desired species, and the provision of the best possible environment for cultivation.

As the need for food has increased, however, the result has been an ever-growing demand for both direct and indirect energy inputs into the process, as illustrated by the increasing dependence of agriculture on complex machinery and chemical fertilizers. The spectacular achievements in yields and output per man in modern agriculture are largely the result of two factors: the application of scientific knowledge and changes in the organizational structure of agriculture as influenced by market imperatives. It is to a large measure the long-term effects of these scientific interventions and structural changes in modern agriculture that have given rise to environmental concerns.

The major environmental concerns in agriculture are related to competition for land, the reliance on certain kinds of inputs for high productivity and the changing structure of agriculture, such as increasing monoculture and animal feed lot production. The problems are briefly commented on below, although such "problems" must be weighed against the great success of Canadian agriculture as a producer of food, not only for national needs, but also as a major supplier for the world market.

Competition for Land Between Agriculture Uses and Requirements for Urban Growth and Industrialization

This problem should not be considered in terms of total farmland (as may be the case in densely populated countries) but rather in the context of relative scarcity of land suitable for agriculture. The length of the growing season, for example, is a key factor in determining the quality and quantity of agricultural production. In Canada, only about 10% of farmland has a growing season in excess of 80 days, but many of these areas are in great demand for residential and industrial purposes. The narrow "fruit belt" of the Niagara Peninsula and the rich farmland of the Lower Fraser Valley are two evident examples. Airphotos 2.5 and 2.6 present a striking example of the speed with which conversion

from farmland to urban uses often takes place. Airphotos 2.7 and 2.8 show other aspects of land competition in the rural-urban fringe.

The Increasing Reliance on Chemical Fertilizers, Herbicides and Insecticides in the Agricultural Process

Traditionally, the productivity of the land was maintained by rotating crops, allowing some fields to lie fallow and returning animal manures and crop residues to the land. These practices have been supplemented, and to a large extent replaced, by the use of chemical fertilizers. For the use of fertilizers to be most effective, their application must be related to the soil, its type, condition and drainage and to climate conditions; otherwise, the nutrients will accumulate in the surface and ground waters, making the water unfit for other uses.

The benefits derived from the use of pesticides, although great, are now being increasingly weighed against the unexpected and often adverse effects. Destruction of waterfowl populations due to mercurial seed treatments and DDT and the side effects on farm workers and rural populations of aerial applications of chemicals are two well documented examples. Perhaps even more important, though, is the fact that the long term, and possibly synergistic effects of exposure to chemicals are virtually unknown with the evidence of adverse effects becoming visible only after many years.

This problem may also be compounded by two other factors. Firstly, many new chemicals whose long-run effects are unknown are being placed on the market each year and secondly, since urbanization is encroaching on some of Canada's best farmland, poorer farmland may have to be used, with a concomitant increase in the demand for fertilizer, pesticides and herbicides.

Structural Changes

The environmental impact of structural change in agriculture is more difficult to assess than the more specific technological changes. Recently, the increasing specialization of large-scale "agro-industries" has become a concern. Examples of this type of activity are the planting of single (or related) crops over extensive areas, sometimes referred to as "monoculture", and the increasing intensity of production within relatively small spaces, for example, animal feed lots and chicken hatcheries. The latter can also result in a pollution problem related to the disposal of wastes. Such developments are considered by some to be environmentally unsound because they lack the healthy symbiotic relationship obtained from species diversity. Such systems seem to require increasing reliance on artificial means in terms of chemical inputs, genetic control and, in the case of meat production, creation of high energy use "indoor" environments.

Agricultural Land as a Recipient of Urban Waste

An animal feed lot and an urban settlement have many similar problems in the collection of food and disposal of waste. With increasing urbanization and industrialization, there is a demand for the surrounding agricultural land for this disposal, resulting in actual and potential sources of hazard, not only from the accumulation of heavy metals and toxic materials, but also because of the concentration of pathogenic organisms. Air pollution brought about by a metropolis or an industry influences plant growth by direct toxic action and by changing the spectrum of the light reaching the plants. Since urbanization is often focused on regions of high agricultural activity, the combined impact necessitates exploitation of the poorer land for farming.

Data

Exhibits 2.1 to 2.3 contain data on farmland use for Canada and the provinces from 1901-71. Chart 2.4 illustrates the fact that urban living space is in competition with agriculture for the land in the warmest parts of the country.

Table 2.10 and Chart 2.11 provide data on quantities of fertilizers sold. The sharp drops in 1969 and 1970 were due to cutbacks in grain planting because of surpluses. The data on pesticides (exhibits 2.12 to 2.14)

are given in value of sales rather than quantity. Although data are collected on quantity it is not possible, at this stage, to reduce these to a common denominator such as “pounds of active ingredients”. Certain types of pesticides were aggregated due to confidentiality restrictions. The data represent only part of the picture because expenditures by all levels of government on pesticides are not readily available. Most of these expenditures are for control of forest insects and weeds along highway rights of way.

Further details of the summary statistics of area fertilized, sprayed with pesticides and irrigated as presented in Table 2.15 can be found in Appendix 4.

The potential polluting properties of animal wastes are highlighted in Table 2.16. Livestock, by type, are multiplied by coefficients to arrive at an estimate of the nitrogen and phosphate content of their manures.

Crude indicators outlining the changes in agricultural inputs are presented in Table 2.17 and Chart 2.18. Tables 2.19 and 2.20 cover the main uses of grain.

Table 2.21 summarizes the data collected by watersheds for some of the more important “agricultural” watersheds. Agriculture data for the remaining watersheds can be found in Appendices 4 and 5.

TABLE 2.1. Farms and Farmlands

| | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 ¹ | 1971 |
|---------------------------------|-------------------|-------|-------|-------|-------|-------|-------------------|---------|
| | millions of acres | | | | | | | |
| Canada | ... | ... | ... | ... | ... | ... | ... | 2,278.6 |
| Improved farmland: | | | | | | | | |
| Cropland | 20.1 | 35.7 | 50.0 | 58.3 | 56.3 | 62.2 | 62.4 | 68.8 |
| Pasture | .. | .. | 7.6 | 8.0 | 8.5 | 10.0 | 10.2 | 10.2 |
| Summer fallow | .. | 2.5 | 12.0 | 17.0 | 23.5 | 22.0 | 28.2 | 26.7 |
| Other | .. | .. | 1.1 | 2.4 | 3.3 | 2.6 | 2.5 | 2.4 |
| Total | 30.2 | 48.7 | 70.8 | 85.7 | 91.6 | 96.9 | 103.4 | 108.1 |
| Unimproved farmland: | | | | | | | | |
| Woodland | 16.8 | 17.5 | 23.8 | 26.6 | 22.3 | 22.8 | 17.2 | 11.5 |
| Other | 16.5 | 42.8 | 46.3 | 50.7 | 59.7 | 54.4 | 51.9 | 50.0 |
| Total | 33.3 | 60.2 | 70.1 | 77.4 | 81.9 | 77.2 | 69.1 | 61.5 |
| Grand total | 63.5 | 108.9 | 140.9 | 163.1 | 173.5 | 174.1 | 172.5 | 169.6 |
| | thousands | | | | | | | |
| Number of farms | 511.1 | 682.8 | 711.1 | 728.6 | 732.9 | 623.1 | 480.9 | 366.1 |
| | acres | | | | | | | |
| Average size of farms | 124.2 | 159.5 | 198.1 | 223.9 | 236.7 | 279.4 | 358.7 | 463.3 |

¹ For the 1961 Census, the definition of a census farm was changed from an agricultural holding of either more than three acres or one to three acres with annual production valued at \$250 or more, to an agricultural holding of at least one acre with annual agriculture sales of \$50 or more.

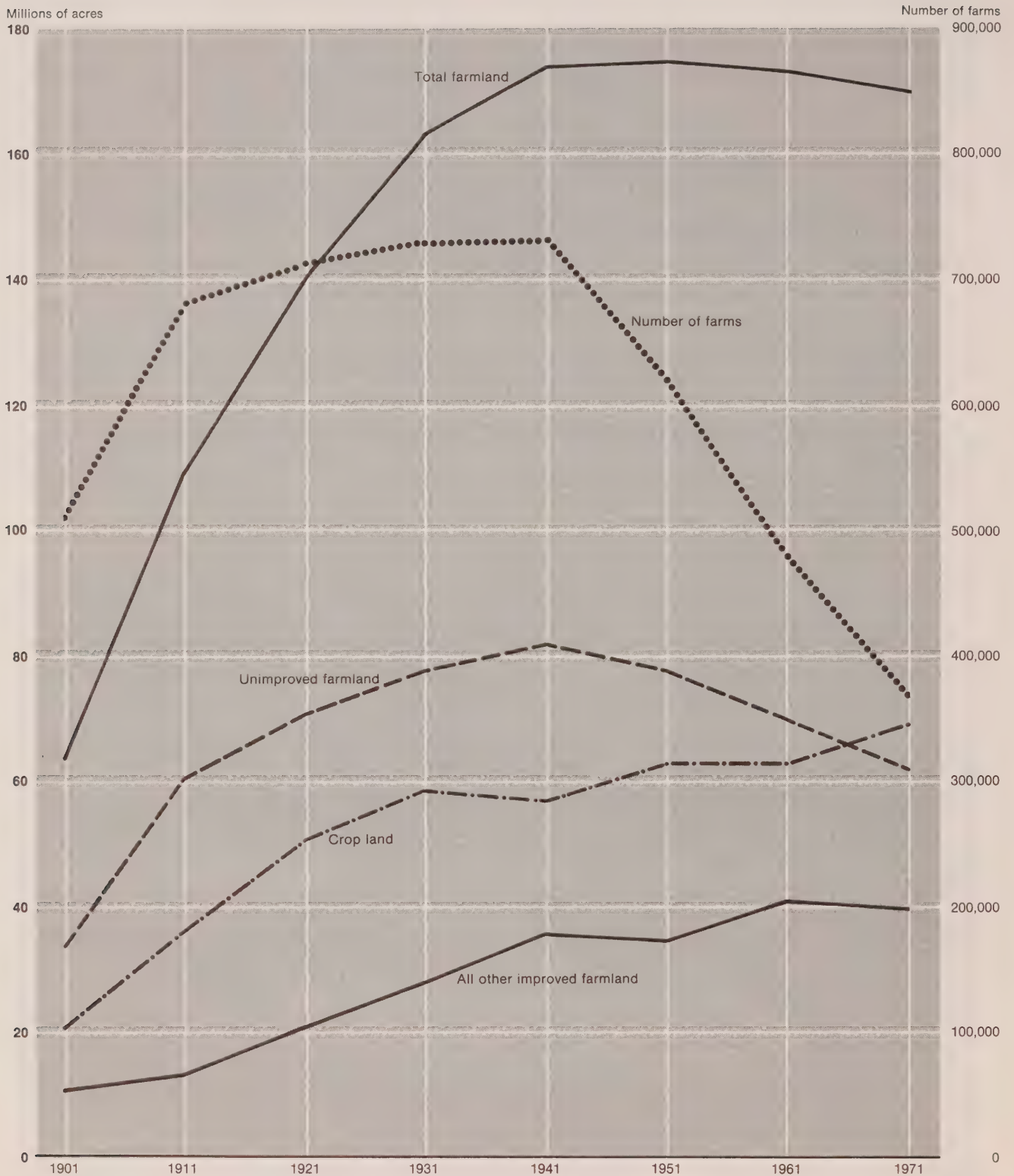
Source: Catalogue 21-503, *Handbook of Agriculture Statistics* (August 1955); 1941 *Census of Canada*, Vol. VIII (1); Catalogue 96-701, 1971 *Census of Canada*.



Pumpkin harvest, Ottawa Valley (photo by Tony Friend)

Chart — 2.2

Farms and Farmland



Source: Same as in Table 2.1.

TABLE 2.3. Farms¹ and Farmlands by Region

| | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 | 1971 |
|---|--------------------|--------|--------|--------|--------|--------|--------|--------|
| | thousands | | | | | | | |
| Number of farms: | | | | | | | | |
| Atlantic ² | 105.2 | 104.4 | 97.8 | 86.3 | 77.1 | 63.7 | 33.4 | 17.1 |
| Central | 344.2 | 361.8 | 335.7 | 328.1 | 332.9 | 284.3 | 217.1 | 156.0 |
| Prairie | 55.2 | 199.2 | 255.7 | 288.1 | 296.5 | 248.7 | 210.4 | 174.7 |
| British Columbia | 6.5 | 17.0 | 22.0 | 26.1 | 26.4 | 26.4 | 19.9 | 18.4 |
| | acres | | | | | | | |
| Average size of farms: | | | | | | | | |
| Atlantic ² | 102 | 105 | 104 | 112 | 116 | 125 | 163 | 205 |
| Central | 104 | 104 | 119 | 122 | 122 | 132 | 151 | 172 |
| Prairie | 279 | 289 | 344 | 381 | 405 | 498 | 617 | 765 |
| British Columbia | 230 | 150 | 130 | 136 | 153 | 178 | 226 | 316 |
| | thousands of acres | | | | | | | |
| Improved farmland: | | | | | | | | |
| Atlantic ² | 3,393 | 3,471 | 3,128 | 2,941 | 2,785 | 2,343 | 1,832 | 1,387 |
| Central | 20,706 | 21,815 | 22,234 | 22,267 | 22,426 | 21,522 | 19,897 | 17,314 |
| Prairie | 5,593 | 22,970 | 44,863 | 59,819 | 65,532 | 71,840 | 80,370 | 87,691 |
| British Columbia | 474 | 478 | 544 | 705 | 893 | 1,148 | 1,303 | 1,755 |
| Improved farmland as a percentage of total land area: | | | | | | | | |
| Atlantic ² | 10.5 | 10.8 | 9.7 | 9.1 | 8.6 | 1.9 | 1.5 | 1.1 |
| Central | 5.8 | 6.1 | 3.4 | 4.1 | 3.9 | 3.8 | 3.6 | 3.1 |
| Prairie | 2.4 | 6.5 | 10.2 | 13.7 | 15.0 | 16.5 | 18.4 | 20.2 |
| British Columbia | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 |

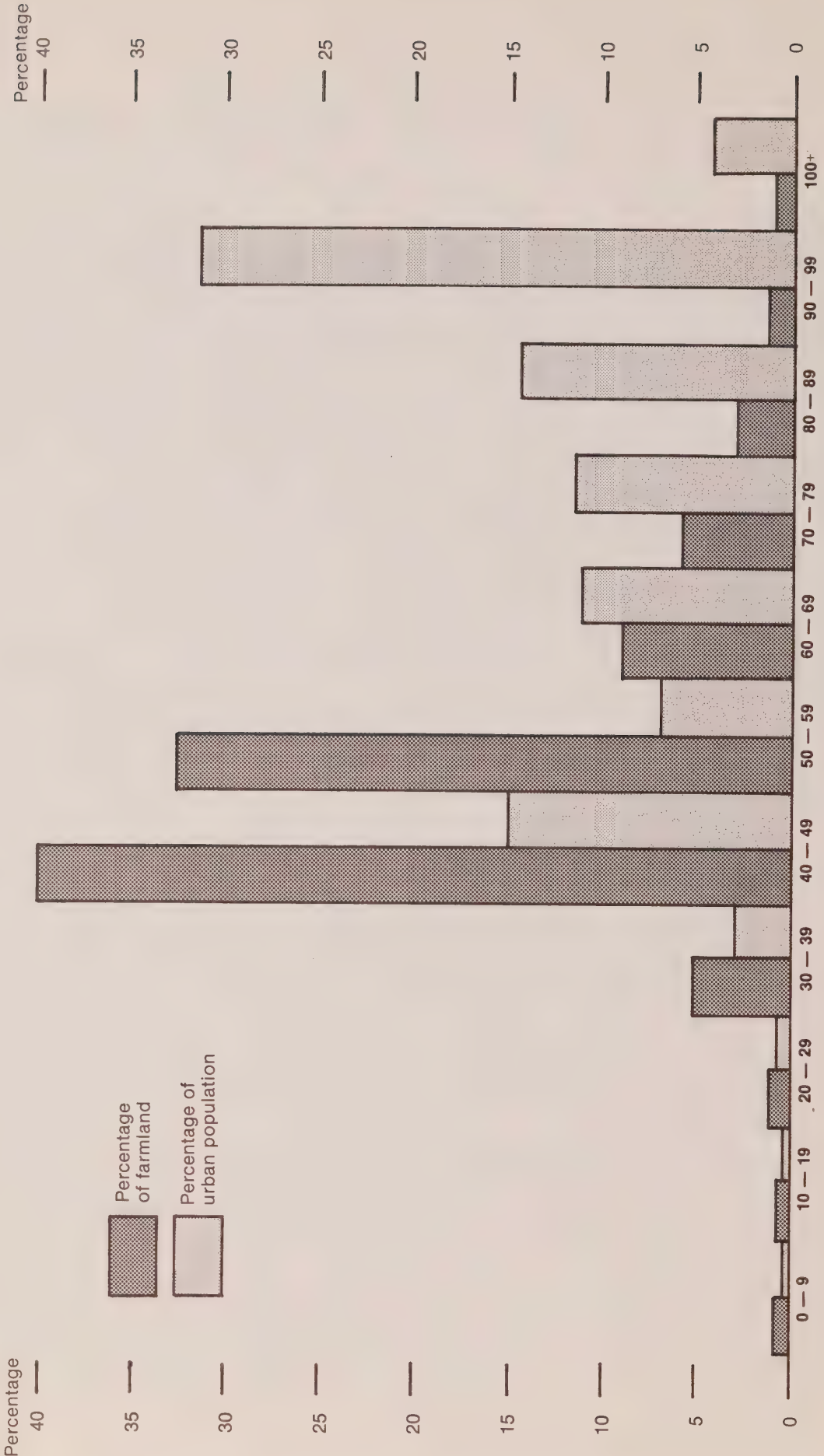
¹ For definition of a census farm and the changes in the definition, see footnote 1, Table 2.1.

² Newfoundland included in the Atlantic region, 1951 - 71.

Source: 1951 Census of Agriculture, Vol. IV (1 and 2); 1971 Census of Agriculture, Vol. IV (1 - 3).

Chart — 2.4

Distribution of Farmland and Urban Population Relative to Good Growing Conditions



Quality of growing conditions
(Estimated number of days from barley ripening to first fall freeze)

Source: Unpublished data from G.D.V. Williams, Agriculture Canada.

Airphoto — 2.5

**An Example of Conversion of Farmland to Urban Uses
in the Toronto C.M.A., 1949-1974**



1949



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

**An Example of Conversion of Farmland to Urban Uses
in the Toronto C.M.A., 1949-1974**



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

**Land Use Competition in the Rural-Urban Fringe:
Agriculture, Highway 401, and an Auto Wrecking Yard
(Near Oshawa)**



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

Airphoto — 2.8

**Land Use Competition
in the Rural-Urban Fringe:
Agriculture, Quarry and Golf Course**



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

TABLE 2.9. Livestock and Poultry¹

| | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 | 1971 |
|-----------------------------|-----------|----------|--------|--------|--------|--------|--------|--------|
| | thousands | | | | | | | |
| Milk cows | 2,409 | 2,595 | 3,229 | 3,523 | 3,626 | 2,908 | 2,990 | 2,257 |
| Other cattle | 3,168 | 3,931 | 5,141 | 4,450 | 4,891 | 5,463 | 8,952 | 11,021 |
| Pigs | 2,354 | 3,635 | 3,324 | 4,700 | 6,081 | 4,916 | 5,333 | 8,107 |
| Sheep | 2,510 | 2,174 | 3,200 | 3,627 | 2,840 | 1,479 | 1,564 | 861 |
| Horses | 1,577 | 2,599 | 3,452 | 3,114 | 2,789 | 1,307 | 512 | 354 |
| Hens and chickens | } 17,923 | { 29,773 | 41,125 | 61,277 | 58,994 | 64,615 | 69,612 | 87,537 |
| Other poultry | | | | | | | | |
| | | { 2,020 | 2,222 | 3,875 | 4,476 | 3,319 | 8,383 | 10,512 |

¹ Includes only animals on census farms; see Table 2.1 for definition of a census farm.

Source: 1941 *Census of Canada*, Vol. I; 1951 *Census of Agriculture*, Vol. VI (1); 1971 *Census of Agriculture*, Catalogue 96-701.

TABLE 2.10. Fertilizers¹ Sold in Canada

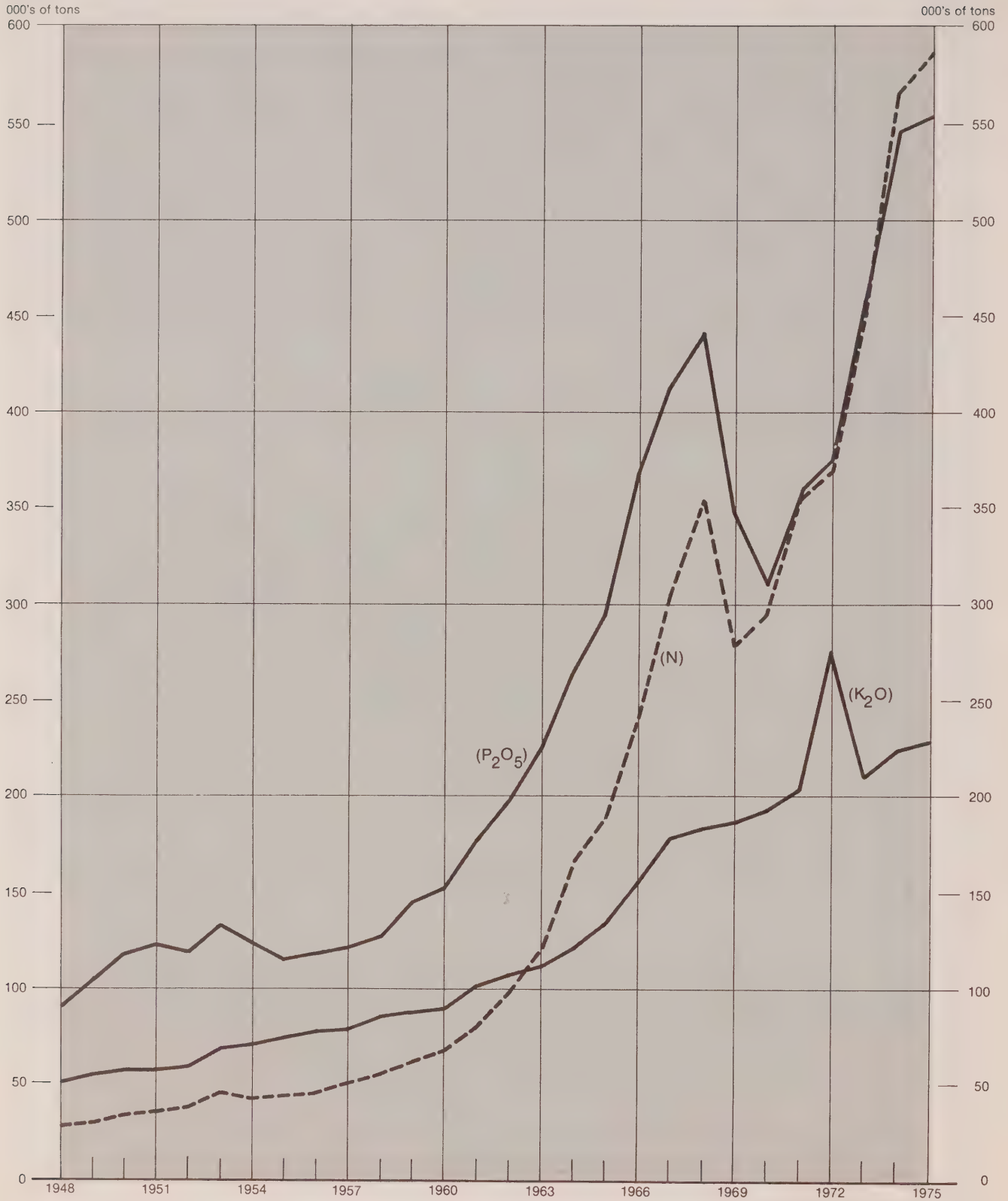
| | Total fertilizers sold | | Total fertilizers sold |
|----------------|---------------------------|----------------|---------------------------|
| | thousands of tons | | thousands of tons |
| 1929 | 224 | 1952 | 769 |
| 1930 | 321 | 1953 | 820 |
| 1931 | 284 | 1954 | 812 |
| 1932 | 180 | 1955 | 791 |
| 1933 | 166 | 1956 | 801 |
| 1934 | 195 | 1957 | 808 |
| 1935 | 212 | 1958 | 871 |
| 1936 | 234 | 1959 | 908 |
| 1937 | 298 | 1960 | 935 |
| 1938 | 323 | 1961 | 1,077 |
| 1939 | 334 | 1962 | 1,144 |
| 1940 | 347 | 1963 | 1,257 |
| 1941 | 324 | 1964 | 1,454 |
| 1942 | 420 | 1965 | 1,594 |
| 1943 | 499 | 1966 | 1,918 |
| 1944 | 535 | 1967 | 2,183 |
| 1945 | 575 | 1968 | 2,293 |
| 1946 | 633 | 1969 | 1,898 |
| 1947 | 661 | 1970 | 1,868 |
| 1948 | 672 | 1971 | 2,111 |
| 1949 | 742 | 1972 | 2,175 |
| 1950 | 765 | 1973 | 2,492 |
| 1951 | 771 | 1974 | 2,876 |

¹ Includes animal manure.

Source: Catalogue 46-207, *Fertilizer Trade*.

Chart — 2.11

**Nutrient Content of Fertilizers Sold:
Tons of Nitrogen (N), Phosphoric Acid (P_2O_5) and Potash (K_2O)**



Source: Same as in Table 2.10.

TABLE 2.12. Sales of Pest Control Products¹ by Canadian Registrants, by Use

| | Agriculture | Home, garden and industrial | Rodenticides | Not specified | Total ² | |
|-------------------|------------------------------|--------------------------------|------------------|---------------|--------------------|--|
| | thousands of current dollars | | | | | thousands of constant 1971 dollars |
| 1947 | 5,431 | 1,561 | 208 | ... | 7,200 | .. |
| 1948 | 8,088 | 2,024 | 202 | ... | 10,315 | .. |
| 1949 | 10,158 | 1,825 | 177 | ... | 12,160 | .. |
| 1950 | 11,048 | 2,343 | 167 | ... | 13,558 | .. |
| 1951 | 12,610 | 2,872 | 319 | ... | 15,801 | .. |
| 1952 | 12,708 | 3,033 | 459 | ... | 16,200 | .. |
| 1953 | 13,578 | 3,795 | 314 | ... | 17,687 | .. |
| 1954 | 14,876 | 4,133 | 347 | ... | 19,356 | .. |
| 1955 | 18,362 | 4,104 | 387 | ... | 22,853 | .. |
| 1956 | 20,154 | 4,208 | 323 | ... | 24,685 | .. |
| 1957 ³ | 14,834 | 4,096 | 344 | 351 | 19,625 | .. |
| 1958 | 15,356 | 4,207 | 349 | 700 | 20,612 | .. |
| 1959 | 18,986 | 5,405 | 447 | 485 | 25,323 | .. |
| 1960 | 20,157 | 5,785 | 511 | 579 | 27,032 | .. |
| 1961 | 25,044 | 7,426 | 561 | 671 | 33,702 | .. |
| 1962 | 27,833 | 6,784 | 482 | 704 | 35,803 | .. |
| 1963 | 28,710 | 6,295 | 557 | 855 | 36,417 | .. |
| 1964 | 27,216 | 6,697 | 579 | 2,028 | 36,520 | .. |
| 1965 | 29,929 | 6,832 | 603 | 1,666 | 39,030 | .. |
| 1966 | 40,228 | 8,483 | 597 | 227 | 49,535 | .. |
| 1967 | 45,581 | 13,380 | 620 | ... | 59,581 | .. |
| 1968 | 53,842 | 11,140 | 708 | ... | 65,690 | .. |
| 1969 | 46,138 | 12,219 | 681 | ... | 59,038 | .. |
| 1970 | 39,945 | 14,081 | 609 | ... | 54,635 | .. |
| 1971 | 41,866 | 14,893 | 566 | ... | 57,325 | 57,325 |
| 1972 | 52,763 | 16,048 | 467 | ... | 69,278 | 66,742 |
| 1973 | 77,070 | 18,632 | 599 | ... | 96,301 | 92,419 |
| 1974 | 108,139 | 21,155 | 435 ⁴ | ... | 129,729 | 91,358 |
| 1975 | 169,497 | 24,507 | 621 | ... | 194,625 | 103,579 |

¹ Does not include sales to governments.

² Constant dollar figures were determined using the Industry Selling Price Index for Pest Control Products.

³ Since 1957, the 12-month reporting period has ended September 30 rather than December 31.

⁴ Agriculture rodenticides only, home and garden rodenticides are confidential.

Source: Catalogue 46-212, *Sales of Pest Control Products by Canadian Registrants*; Catalogue 62-001, *Industry Price Indexes*.

TABLE 2.13. Sales of Pesticides for Agricultural Use

| | Insecticides | Herbicides | Insecticides ¹ | Herbicides ¹ |
|------|------------------------------|------------|------------------------------------|-------------------------|
| | thousands of current dollars | | thousands of constant 1971 dollars | |
| 1947 | 1,799 | 1,046 | .. | .. |
| 1948 | 1,692 | 3,570 | .. | .. |
| 1949 | 2,669 | 4,676 | .. | .. |
| 1950 | 2,587 | 5,763 | .. | .. |
| 1951 | 2,199 | 6,926 | .. | .. |
| 1952 | 1,876 | 6,247 | .. | .. |
| 1953 | 2,107 | 5,700 | .. | .. |
| 1954 | 3,069 | 4,721 | .. | .. |
| 1955 | 3,223 | 5,730 | .. | .. |
| 1956 | 2,799 | 5,974 | .. | .. |
| 1957 | 3,354 | 6,450 | .. | .. |
| 1958 | 3,698 | 5,666 | .. | .. |
| 1959 | 4,742 | 7,608 | .. | .. |
| 1960 | 4,364 | 8,396 | .. | .. |
| 1961 | 7,268 | 10,295 | .. | .. |
| 1962 | 7,679 | 11,333 | .. | .. |
| 1963 | 7,642 | 12,736 | .. | .. |
| 1964 | 5,355 | 14,561 | .. | .. |
| 1965 | 5,110 | 17,194 | .. | .. |
| 1966 | 5,000 | 16,082 | .. | .. |
| 1967 | 4,815 | 19,672 | .. | .. |
| 1968 | 7,048 | 34,672 | .. | .. |
| 1969 | 7,105 | 27,524 | .. | .. |
| 1970 | 6,953 | 21,286 | .. | .. |
| 1971 | 8,987 | 25,805 | 8,987 | 25,805 |
| 1972 | 8,925 | 34,797 | 8,598 | 33,523 |
| 1973 | 11,628 | 53,330 | 11,159 | 51,180 |
| 1974 | 14,784 | 79,792 | 10,411 | 56,192 |

¹ See footnote 2, Table 2.12.

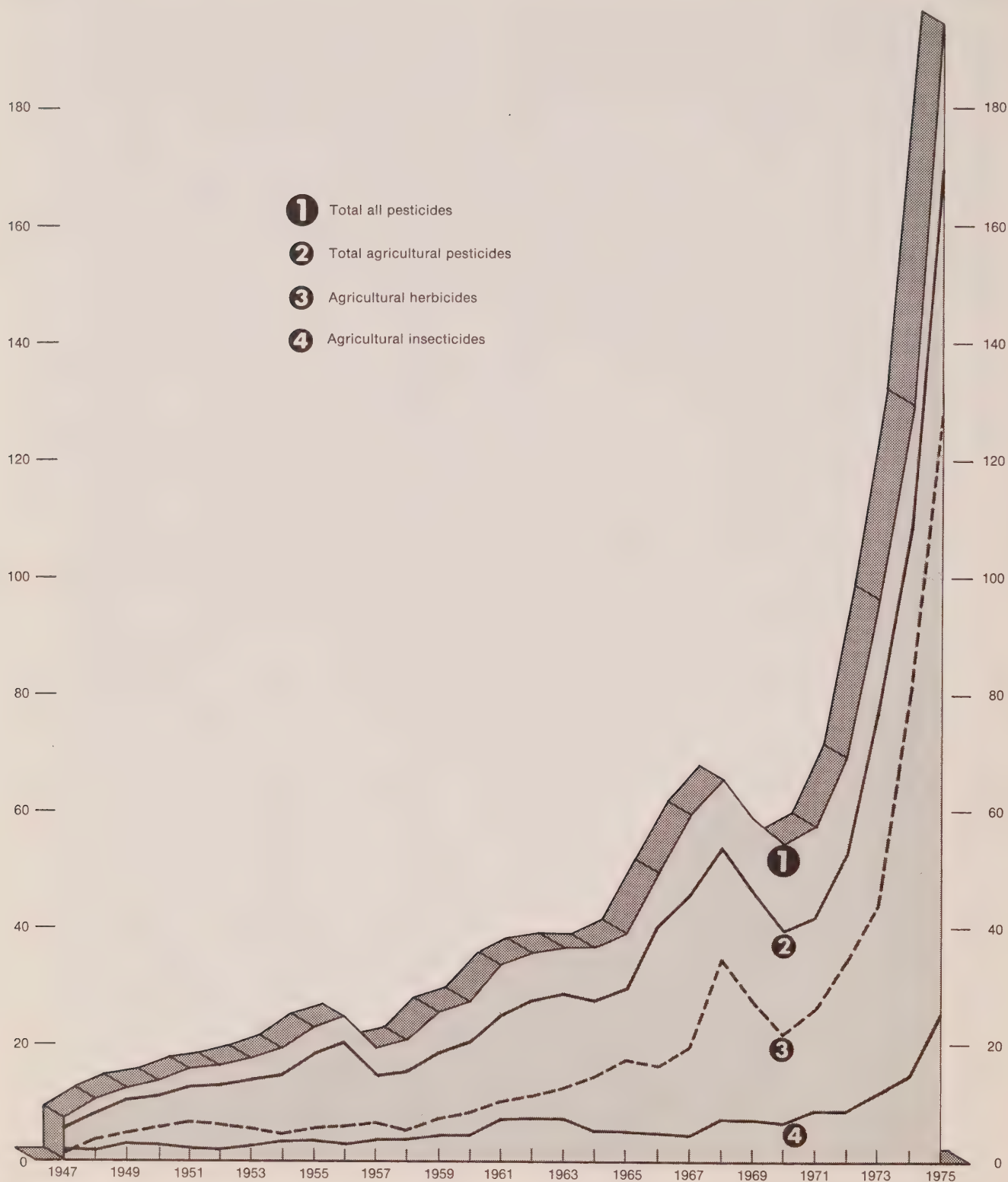
Source: Same as in Table 2.12.

Chart — 2.14

Sales of Pest Control Products

Millions of current dollars
200 —

Millions of current dollars
200 —



Source: Same as in Table 2.12.

TABLE 2.15. Improved Farmlands Sprayed, Fertilized and Irrigated, by Province, 1971

| | Improved farmlands | Percentage of improved farmlands | | | | |
|--------------------------------|--------------------|----------------------------------|-------------|-------------|--------------|------------|
| | | Sprayed for | | Fertilized | Irrigated by | |
| | | Insects | Weeds | | Sprinkler | Other |
| | acres | | | | | |
| Newfoundland | 19,148 | 6.4 | 4.8 | 29.7 | 0.2 | 0.4 |
| Prince Edward Island | 494,131 | 13.0 | 21.6 | 28.1 | -- | 0.1 |
| Nova Scotia | 386,021 | 6.4 | 10.0 | 24.4 | 0.2 | 0.3 |
| New Brunswick | 487,380 | 12.5 | 14.9 | 18.9 | 0.1 | 0.6 |
| Quebec | 6,449,992 | 2.1 | 6.4 | 18.0 | 0.2 | 1.3 |
| Ontario | 10,864,601 | 5.3 | 25.4 | 28.5 | 0.5 | 0.4 |
| Manitoba | 12,803,988 | 2.4 | 32.8 | 22.9 | -- | -- |
| Saskatchewan | 46,426,487 | 1.3 | 17.2 | 8.0 | -- | 0.2 |
| Alberta | 28,460,328 | 1.4 | 19.2 | 19.6 | 0.4 | 1.4 |
| British Columbia | 1,755,247 | 4.3 | 7.8 | 18.2 | 4.6 | 8.0 |
| Canada | 108,148,877 | 2.1 | 19.6 | 15.8 | 0.3 | 0.7 |

Source: Catalogue 96-701, 1971 Census of Agriculture.

TABLE 2.16. Nitrogen (N) and Phosphorus (P₂O₅) Content of Manure by Species, 1971

| | Population | N coefficient | Total nitrogen | P ₂ O ₅ coefficient | Total P ₂ O ₅ |
|--|------------|------------------------|----------------|---|-------------------------------------|
| | | pounds per animal year | tons | pounds per animal year | tons |
| Cattle: | | | | | |
| Milk cows | 2,257,465 | 140 | 158,023 | 65 | 73,368 |
| Bulls | 258,066 | 140 | 18,065 | 65 | 8,387 |
| Beef cows | 3,515,847 | 70 | 123,055 | 32 | 56,254 |
| Calves | 3,668,486 | 30 | 55,027 | 11 | 20,177 |
| Steers | 1,721,118 | 58 | 49,912 | 36 | 30,980 |
| Heifers | 1,857,251 | 58 | 53,860 | 36 | 33,431 |
| Total | .. | .. | 457,942 | .. | 222,597 |
| Poultry: | | | | | |
| Hens | 27,299,147 | 1.5 | 20,474 | 1 | 13,650 |
| Pullets | 60,238,032 | 0.5 | 15,060 | 0.3 | 9,036 |
| Other | 10,512,362 | 1.2 | 6,307 | 0.1 | 526 |
| Total | .. | .. | 41,841 | .. | 23,212 |
| Mink | 1,402,028 | 0.8 | 561 | 2.4 | 1,682 |
| Hogs | 8,106,926 | 23 | 93,230 | 14 | 56,748 |
| Sheep | 860,789 | 15 | 6,456 | 9 | 3,874 |
| Horses | 354,297 | 95 | 16,829 | 33 | 5,846 |
| Grand total¹ | .. | .. | 616,859 | .. | 313,959 |

¹ The nutrient content of commercial fertilizers sold in 1971 was: nitrogen 356,140 tons and phosphorus 359,781 tons.

Source: 1971 Census of Agriculture, Vol. IV (1); Agricultural Land Uses, Livestock and Soils of the Canadian Great Lakes Basin, Agriculture Canada, June 1974.

TABLE 2.17. Indicators of Technological Change, Selected Agricultural Inputs

| | Croplands | Labour force ¹ | Fertilizers | Tractors and combines ² | Per 1,000 acres of cropland | | |
|------------|-----------------------|------------------------------|-------------|--|-----------------------------|-------------|-----------|
| | | | | | Workers | Fertilizers | Machinery |
| | thousands of acres | number | tons | number | | tons | number |
| 1901 | 20,242 | 718,281 | .. | .. | 36 | .. | .. |
| 1911 | 35,898 | 928,336 | .. | .. | 26 | .. | .. |
| 1921 | 50,034 | 1,025,358 | .. | 47,455 | 20 | .. | 1 |
| 1931 | 58,340 | 1,118,342 | 284,207 | 114,277 | 19 | 5 | 2 |
| 1941 | 56,280 | 1,074,904 | 324,201 | 178,765 | 19 | 6 | 3 |
| 1951 | 62,212 | 826,093 | 770,507 | 490,186 | 13 | 12 | 8 |
| 1961 | 62,436 | 648,910 | 1,077,412 | 705,400 | 10 | 17 | 11 |
| 1971 | 68,766 | 512,150 | 2,110,978 | 759,449 | 7 | 31 | 11 |

¹ Includes workers aged 10 and over in 1901 and 15 and over in all other years.

² Includes only tractors in 1921.

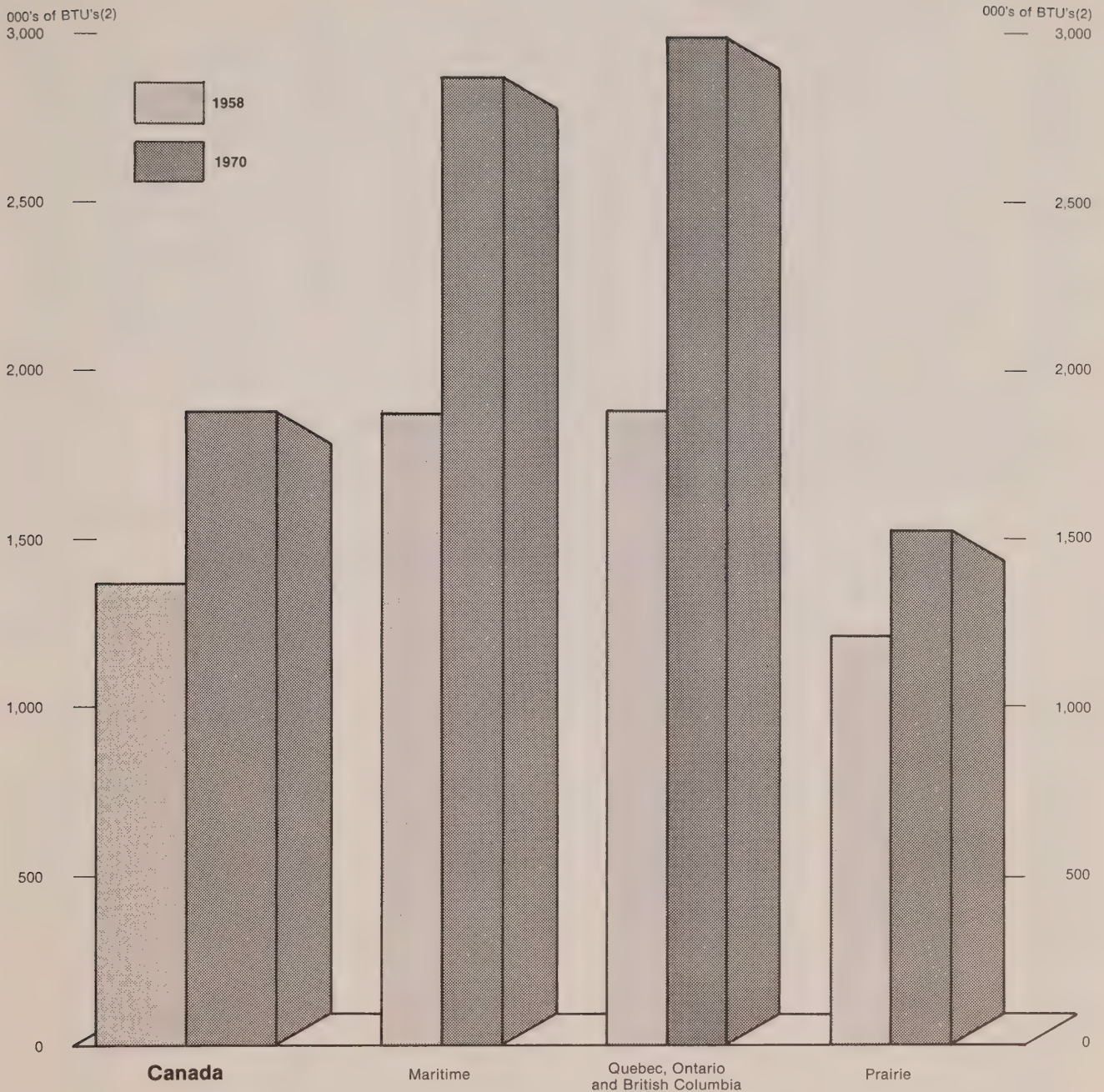
Source: 1921 *Census of Canada*, Vol IV; 1961 *Census of Canada*, Vol. III (2); Catalogue 46-207, *Fertilizer Trade*; 1971 *Census of Agriculture*, Vol IV. (1).



Sheep, Ottawa Valley (N.F.B. Phototheque, photo by Hans Blohm)

Chart — 2.18

Fuel (1) Use per Cultivated Acre(3), by Region



(1) Includes gasoline and diesel fuel used on farms by trucks, tractors and combines. The 1958 fuel amounts are from a special survey. The 1970 amounts of fuel were estimated using fuel expenditures, provincial fuel prices and numbers of trucks, tractors and combines.

(2) The BTU contents of the gasoline and diesel fuel was calculated using the following equivalents:
gasoline 0.1492×10^6 BTU/gallon
diesel 0.1665×10^6 BTU/gallon

(3) The cultivated acreage is based on the harvested acres of principal field crops, vegetables and tobacco.

Source: Catalogue 21-003, QUARTERLY BULLETIN OF AGRICULTURAL STATISTICS (1959, 1966 and 1971); Catalogue 21-510, 1958 FARM SURVEY REPORT, MOTOR VEHICLES AND MACHINERY ON FARMS; unpublished data from the Agriculture Division, Statistics Canada.

TABLE 2.19. Domestic Use of Principal Grains¹

| Crop year | Human food | Seed requirements | Industrial use ² | Loss in handling ³ | Animal feed ⁴ | Total | Total domestic grain use |
|-------------------|------------|-------------------|-----------------------------|-------------------------------|--------------------------|-------|--------------------------|
| | per cent | | | | | | thousands of bushels |
| 1955-56 | 8.1 | 11.1 | 2.7 | 0.1 | 78.0 | 100.0 | 700,420 |
| 1956-57 | 8.5 | 11.3 | 2.9 | 0.1 | 77.2 | 100.0 | 681,688 |
| 1957-58 | 8.6 | 11.2 | 3.0 | 0.1 | 77.1 | 100.0 | 676,481 |
| 1958-59 | 8.4 | 11.0 | 2.7 | 0.1 | 77.8 | 100.0 | 696,974 |
| 1959-60 | 8.8 | 10.8 | 2.8 | 0.8 | 76.8 | 100.0 | 690,200 |
| 1960-61 | 8.7 | 10.4 | 2.8 | 0.1 | 78.0 | 100.0 | 713,285 |
| 1961-62 | 10.8 | 12.6 | 3.2 | 0.2 | 73.2 | 100.0 | 599,826 |
| 1962-63 | 8.8 | 11.3 | 3.2 | 0.1 | 76.6 | 100.0 | 666,239 |
| 1963-64 | 9.2 | 10.7 | 2.8 | 0.1 | 77.2 | 100.0 | 710,508 |
| 1964-65 | 9.2 | 10.6 | 3.2 | 0.2 | 76.8 | 100.0 | 700,779 |
| 1965-66 | 9.1 | 10.5 | 3.5 | 0.4 | 76.5 | 100.0 | 736,981 |
| 1966-67 | 8.4 | 9.7 | 3.7 | 0.3 | 77.9 | 100.0 | 775,060 |
| 1967-68 | 9.2 | 10.5 | 4.1 | -- | 76.2 | 100.0 | 719,968 |
| 1968-69 | 9.1 | 9.8 | 4.1 | 0.8 | 76.2 | 100.0 | 728,325 |
| 1969-70 | 8.7 | 6.7 | 4.0 | 0.2 | 80.4 | 100.0 | 802,488 |
| 1970-71 | 8.1 | 8.0 | 4.0 | 0.1 | 79.8 | 100.0 | 857,404 |
| 1971-72 | 7.8 | 7.3 | 4.3 | 0.2 | 80.4 | 100.0 | 910,334 |
| 1972-73 | 7.9 | 8.2 | 4.5 | 0.2 | 79.2 | 100.0 | 885,618 |
| 1973-74 | 8.2 | 7.7 | 4.5 | 0.3 | 79.3 | 100.0 | 866,891 |

¹ Includes wheat, oats, barley, rye and flaxseed. Rapeseed is included from 1965-66.

² Includes grains used in the following industries: distilling, alcohol, malting, brewing, feed, starch, adhesives, miscellaneous chemicals, explosives, pulp and paper; also flaxseed and rapeseed crushed for subsequent export as oil and oil meal.

³ Includes drying loss, outturn loss (lake and rail), fire and storage loss, etc.

⁴ Residual after estimating for other uses; includes waste and dockage.

Source: Catalogue 22-201, *Grain Trade of Canada* (1961-62, 1966-67, 1972-73).

TABLE 2.20. Grain¹ Consumed Per Grain Consuming Animal Unit²

| Crop year | Total amount consumed | Grain consuming animal units | Consumption per unit |
|--------------------------------|-----------------------|------------------------------|----------------------|
| | thousands of tons | thousands | tons |
| 1950-51 | 11,547 | 14,016 | 0.82 |
| 1951-52 | 13,525 | 14,595 | 0.93 |
| 1952-53 | 12,052 | 15,250 | 0.79 |
| 1953-54 | 12,056 | 14,321 | 0.84 |
| 1954-55 | 12,049 | 15,015 | 0.80 |
| 1955-56 | 13,278 | 15,277 | 0.87 |
| 1956-57 | 12,808 | 15,525 | 0.82 |
| 1957-58 | 12,801 | 15,900 | 0.81 |
| 1958-59 | 13,310 | 17,063 | 0.78 |
| 1959-60 | 13,002 | 17,634 | 0.74 |
| 1960-61 | 13,370 | 16,312 | 0.82 |
| 1961-62 | 11,067 | 16,004 | 0.69 |
| 1962-63 | 12,759 | 15,485 | 0.82 |
| 1963-64 | 13,430 | 15,903 | 0.84 |
| 1964-65 | 13,490 | 16,775 | 0.80 |
| 1965-66 | 14,585 | 16,427 | 0.89 |
| 1966-67 | 15,799 | 16,633 | 0.94 |
| 1967-68 | 15,125 | 17,215 | 0.88 |
| 1968-69 | 16,068 | 16,771 | 0.96 |
| 1969-70 | 17,764 | 17,116 | 1.04 |
| 1970-71 | 18,885 | 18,879 | 1.00 |
| 1971-72 | 20,360 | 19,251 | 1.06 |
| 1972-73 | 20,000 | 19,037 | 1.05 |
| 1973-74 ^P | 20,336 | 19,205 | 1.06 |

¹ Includes wheat, oats, barley, rye, corn, buckwheat and mixed grains.

² Grain consuming animal unit equals the equivalent in consumption of grain of one average milk cow per year.

Weights used:

Milk cows 1.00
Other cattle 0.51
Horses 0.50

Hogs 0.87
Sheep 0.04
Poultry 0.045

The units for a particular crop year are based on the estimated number of livestock and poultry as at June 1 immediately preceding that crop year.

The amount of grain consumed is somewhat dependent on prices, therefore, if prices are high, cattle are switched to pasture or fodder. Hogs, however, are always fed on grain.

Source: Catalogue 21-003, *Quarterly Bulletin of Agricultural Statistics* (1961, 1962, 1963, 1973 and October-December 1974).

TABLE 2.21. Intensity of Agricultural Activity by Selected Watersheds, 1971

| Watersheds ¹ | Code | Total area | Farmlands | | Percentage of farmlands fertilized |
|---|----------|--------------------|-----------|------------------|------------------------------------|
| | | thousands of acres | | per cent of area | |
| Assiniboine River | 24 | 39,852.9 | 35,927.3 | 90.1 | 5.5 |
| South Saskatchewan, Red Deer Rivers | 253 | 37,842.6 | 32,070.8 | 84.7 | 7.6 |
| North Saskatchewan River. | 251, 252 | 37,837.8 | 27,693.7 | 73.2 | 11.5 |
| Lake Winnipeg | 23 | 69,409.9 | 14,221.3 | 20.5 | 17.9 |
| Peace River | 320 | 77,281.9 | 7,157.0 | 9.3 | 12.9 |
| Gulf of Mexico Basin | 5 | 6,339.2 | 5,998.1 | 94.6 | 0.6 |
| Lake Erie and Lake St. Clair | 17 | 6,012.4 | 4,477.3 | 74.5 | 56.8 |
| Bow River | 254 | 6,169.6 | 3,285.1 | 53.2 | 13.1 |
| Eastern Townships, Quebec | 144 | 5,642.8 | 3,111.8 | 55.1 | 22.8 |
| Fraser River | 41 | 57,403.8 | 2,869.4 | 5.0 | 9.1 |
| South Lake Huron | 180 | 4,013.4 | 2,832.8 | 70.6 | 26.9 |
| Chaudière River | 142 | 4,777.9 | 2,172.4 | 45.5 | 12.0 |
| Lower Ottawa River (Ontario part). | 150-35 | 2,367.9 | 1,372.4 | 58.0 | 14.0 |
| Lake Simcoe | 181 | 5,561.5 | 1,238.6 | 22.3 | 31.9 |
| Saint John River | 13 | 9,307.2 | 1,188.0 | 12.8 | 29.8 |
| Trent System | 161 | 3,326.5 | 1,121.2 | 33.7 | 12.3 |
| Columbia River | 40 | 25,398.7 | 903.2 | 3.6 | 23.8 |
| Belleville | 160 | 1,998.8 | 813.5 | 40.7 | 11.1 |
| Prince Edward Island | 114 | 1,399.0 | 774.6 | 55.4 | 56.0 |
| West St. Lawrence River | 147 | 1,488.2 | 739.7 | 49.7 | 12.9 |
| North Gaspé Coast | 112 | 3,448.2 | 733.8 | 21.3 | 13.5 |
| Bay of Fundy (south part) | 120 | 3,797.6 | 666.6 | 17.6 | 27.3 |
| Montréal | 146 | 1,232.5 | 573.9 | 46.6 | 53.9 |
| Niagara | 165 | 811.7 | 363.2 | 44.7 | 85.4 |
| | | | | | |
| | | Croplands | Cattle | Pigs | Number of farms |
| | | thousands of acres | thousands | | |
| Assiniboine River | 16,561.8 | 1,618.1 | 720.7 | 48,090 | |
| South Saskatchewan, Red Deer Rivers | 11,536.8 | 2,061.3 | 814.6 | 31,678 | |
| North Saskatchewan River. | 11,313.2 | 1,817.4 | 995.3 | 38,363 | |
| Lake Winnipeg | 6,680.4 | 803.6 | 828.0 | 28,255 | |
| Peace River | 2,979.2 | 29.4 | 12.8 | 9,630 | |
| Gulf of Mexico Basin | 1,166.3 | 257.8 | 27.1 | 2,431 | |
| Lake Erie and Lake St. Clair | 3,094.4 | 331.4 | 468.2 | 32,544 | |
| Bow River | 1,101.8 | 345.2 | 84.6 | 3,394 | |
| Eastern Townships, Quebec | 1,411.9 | 570.1 | 450.6 | 17,673 | |
| Fraser River | 357.2 | 393.8 | 49.8 | 9,598 | |
| South Lake Huron | 1,410.7 | 751.0 | 599.3 | 15,784 | |
| Chaudière River | 812.6 | 400.4 | 498.1 | 13,261 | |
| Lower Ottawa River (Ontario part). | 604.9 | 286.4 | 58.3 | 7,290 | |
| Lake Simcoe | 534.0 | 256.0 | 158.8 | 7,287 | |
| Saint John River | 299.9 | 98.5 | 41.7 | 4,605 | |
| Trent System | 404.3 | 219.6 | 83.9 | 5,808 | |
| Columbia River | 157.4 | 100.3 | 10.6 | 4,854 | |
| Belleville | 285.6 | 120.1 | 34.9 | 3,767 | |
| Prince Edward Island | 351.4 | 106.1 | 100.9 | 4,543 | |
| West St. Lawrence River | 318.7 | 144.9 | 23.2 | 4,009 | |
| North Gaspé Coast | 258.7 | 92.7 | 41.6 | 3,358 | |
| Bay of Fundy (south part) | 145.8 | 75.6 | 56.5 | 2,894 | |
| Montréal | 345.3 | 97.6 | 38.8 | 4,622 | |
| Niagara | 240.7 | 54.5 | 79.5 | 4,956 | |

¹ Ranked by farmland acreage.

Source: Same as in Table 1.4.

CHAPTER III

FORESTS

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FORESTS

The great expanse of forests that blanket Canada's mid-latitudes is a central part of the nation's image. Canadian history is laced with references to the role of the forest as an arena for events, as a resource, or as an impediment to movement and development. A common theme underlying much of the forest's use throughout the period is that it has been an object to be conquered, controlled and modified for man's benefit.

These modifications result in a variety of stresses, some of which may produce unforeseen and undesirable consequences. Every use of the forest by man gives rise to stresses. An approximate measure of their relative strengths can be made by determining the length of time it takes the system to return to an approximation of its natural state.

The short-term effects of stressors can be predicted fairly accurately and, with proper resource management, impacts can be softened. The long-term effects of stress on the forest system are not as clear. While certain probabilities can be estimated and scenarios designed, ultimate consequences for extended periods of time are largely unknown.

The forest is much more than just a tree resource. It is, first of all, a diverse biological community consisting of trees, plants and animals, together with other components, such as soils, water resources and climate. A change in one sector of this community causes reactions in other parts. The greatest stresses on this system usually come from the forestry industry.

In 1973, 31% of Canada's area was classed as forest land (see Table 3.2). Of this total, slightly over 50% is considered to be suitable and economically profitable for regular harvest.

Although the depletion of the forest as a resource may appear to be a first concern, there is no national shortage of forest resources in this country at present. By moving into ever more remote areas and by introducing new techniques of harvesting, the industry has been able to find sufficient quantities of good timber to satisfy demands, albeit with continually escalating costs. At regional levels, however, there have been a number of cases where serious depletion has taken place. An indication of the extent to which Canadian forests have been cut over is that 54% of land presently inventoried for timber production is classed as young or immature growth.¹ (Tables 3.6 to 3.8 present data on

forest depletion.) The logging industry in Nova Scotia and New Brunswick suffers from a lack of large numbers of mature trees due to the demand placed on the resource over many years. In British Columbia, the fast replacement rate for trees, due to a long growing season, fertile soil and great quantities of moisture, allows more intensive harvesting to take place. Even here, however, the methods of the forestry industry are likely to put stress on local environments.

Photograph 3.1 illustrates current techniques used widely on Vancouver Island. This airphoto, taken from 30,000 feet, presents several valleys that have been clear cut and a number of mountain sides that have been strip cut of trees. A network of logging roads covers much of the area. The total effect of such action on the local environment is not entirely known. Clear cutting of trees tends to increase the chance of soil erosion and long-term exposure of previously tree-covered soil could change its chemical composition. Activity patterns of wildlife in the area have undoubtedly been altered and their populations may have been reduced. Intensive forestry in an area also affects water quality in lakes and streams, at least to the extent that soil runoff changes water clarity. Local drainage patterns may be changed by the presence of roads and other physical alterations of the landscape. Removal of forest is known to produce small-scale local climate changes. The exposed areas are likely to experience greater temperature variations, for instance, than adjacent treed lands. In time, the natural regenerative processes restore the affected areas, although certain adverse effects of lumbering may be evident for some time after the actual cutting operations cease.

The timber industry often tends to concentrate efforts on one or several species that have proven to be more valuable than others. As a result of this, one type of tree may be over-harvested, upsetting the natural species mix in the forest and placing some pressures on the depleted species' ability to regenerate in numbers. An active policy of reforestation on the part of the forest industry is the best method to help restore the forest to some semblance of its former state. This process, however, has proven to be exceedingly expensive for an industry in which profit margins are already slim in many parts of the country. (In fact, only 5% of the annual depleted acreage in Canada is replanted.)² The remainder is left to be reforested by slow natural methods. As harvests increase each year (Table 3.6) it seems inevitable that the pressures put on the remaining forests will grow at an accelerating rate.

The reforestation process itself may also result in pressures on the natural community. Species replanted

¹ Manning, G.H., and Grinnel, H.R., *Forest Resources and Utilization in Canada to the Year 2000*, Environment Canada, Ottawa, 1971.

² Chapman, J.D., *Natural Resource Developments in Canada, 1970-75, The Canadian Geographer*, Vol. XX, 1, spring 1976.

are only those considered economically valuable. By introducing an overabundance of one species of tree and failing to consider other necessary members of the system, the natural balance could be upset and unforeseen changes conceivably could occur.

The logging industry, however, is not the only cause of man-made stress on the forest. The use of the forest as prime recreation land, for hunting and for transportation corridors, subjects it to a variety of man-induced pressures, one of the most notable being forest fires.

Available data on forest stocks (Tables 3.2 to 3.5) are quite good when compared with information available on other natural resource stocks such as, for example, quantities of fish in the North Atlantic, or total potential commercial reserves of oil. Excellent

estimates of forest reserves can be made by ground-sampling counts, airphoto analysis, or simple calculations based on the known percentage of forested land in an area. Other methods of remote sensing, including false colour airphoto and satellite pictures, may allow judgments to be made concerning the quality of the trees present. The data available in most cases, however, are still closely geared to providing information for the logging industry. While it is necessary to have information in a format suitable for the needs of industry, it would also be useful in the future to organize data in a more scientifically-oriented format. To be specific, little or no data are currently available concerning the effects of the man-induced stressors mentioned in this chapter on the forest system. Also, collection of data for biological sub-areas, covering all components of the forest system, might in future provide a better handle for more effective management of this valuable resource.

Logging Activity on Vancouver Island



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

TABLE 3.2. Classification of Forest Lands, 1973

| | Acres | Per cent of total |
|---|----------------|-------------------|
| | thousands | |
| Private | 56,120 | 7.0 |
| Federal and provincial Crown lands: | | |
| Reserved for parks, conservation areas | 38,235 | 4.7 |
| Allocated for forestry production. | 348,647 | 43.3 |
| Not allocated | 96,828 | 12.0 |
| Not suitable for regular harvest ¹ | 19,961 | 2.5 |
| Not economically viable | 246,092 | 30.5 |
| Total | 805,883 | 100.0 |
| Total area of Canada | 2,478,993 | ... |

¹ Because of low productivity.

Source: Catalogue 25-202, *Canadian Forestry Statistics* (1973).

TABLE 3.3. Classification of Forest Lands by Province, 1973

| | Private | Crown lands | | | | | Total | thousands of acres |
|---------------------------------|---------|-------------|------------------------------|----------------------------------|----------------------------------|------------------------------------|-------|--------------------|
| | | Reserved | Allocated to wood production | Not allocated to wood production | Not suitable for regular harvest | Not economical for regular harvest | | |
| | | per cent | | | | | | |
| Newfoundland. | 4 | 2 | 11 | 8 | 7 | 68 | 100 | 31,504 |
| Prince Edward Island. | 94 | 1 | 4 | 1 | — | — | 100 | 619 |
| Nova Scotia | 72 | 4 | 24 | — | — | — | 100 | 10,982 |
| New Brunswick | 54 | 2 | 44 | — | — | — | 100 | 15,594 |
| Quebec. | 10 | — | 32 | 52 | 6 | — | 100 | 171,998 |
| Ontario. | 10 | — | 82 | — | — | 8 | 100 | 106,806 |
| Manitoba. | 2 | 3 | 65 | — | — | 30 | 100 | 33,476 |
| Saskatchewan | 3 | 5 | 63 | 2 | — | 27 | 100 | 31,678 |
| Alberta. | 2 | 18 | 52 | — | 9 | 19 | 100 | 75,663 |
| British Columbia | 5 | 3 | 71 | 5 | — | 16 | 100 | 134,652 |
| Yukon and Northwest Territories | — | 8 | 8 | — | — | 84 | 100 | 192,611 |

Source: Same as in Table 3.2.

TABLE 3.4. Merchantable¹ Timber by Province, 1973

| | Softwoods | Hardwoods | Total | Provincial share of total |
|--------------------------------|------------------------|-----------|---------|---------------------------|
| | millions of cubic feet | | | per cent |
| Newfoundland | 7,775 | 1,241 | 9,016 | 1.3 |
| Prince Edward Island | 136 | 64 | 200 | -- |
| Nova Scotia | 6,283 | 2,672 | 8,955 | 1.3 |
| New Brunswick | 14,655 | 5,793 | 20,448 | 3.0 |
| Quebec | 96,965 | 33,466 | 130,431 | 19.4 |
| Ontario | 91,390 | 58,269 | 149,659 | 22.2 |
| Manitoba | 12,174 | 3,584 | 15,758 | 2.3 |
| Saskatchewan | 10,343 | 7,011 | 17,354 | 2.6 |
| Alberta | 33,638 | 20,102 | 53,740 | 8.0 |
| British Columbia | 260,375 | 7,224 | 267,599 | 39.8 |
| Canada | 533,734 | 139,426 | 673,160 | 100.0 |

¹ Suitable for commercial purposes, but not necessarily economically profitable to harvest.

Source: Same as in Table 3.2.

TABLE 3.5. Merchantable Timber by Species, 1973

| Species | Volume | Percentage of total merchantable timber | Species | Volume | Percentage of total merchantable timber |
|----------------------------------|------------------------|---|------------------------|------------------------|---|
| | millions of cubic feet | | | millions of cubic feet | |
| Softwoods: | | | Hardwoods: | | |
| Spruce | 220,098 | 32.7 | Poplar | 66,368 | 9.9 |
| Balsam fir | 98,493 | 14.6 | White birch | 32,981 | 4.9 |
| Douglas fir | 17,865 | 2.7 | Yellow birch | 12,897 | 1.9 |
| Hemlock | 63,755 | 9.5 | Maple | 18,322 | 2.7 |
| White pine | 6,827 | 1.0 | Beech | 3,182 | 0.5 |
| Red pine | 1,432 | 0.2 | Elm | 98 | -- |
| Jack and lodgepole pines | 82,243 | 12.2 | Ash. | 998 | 0.1 |
| Ponderosa pine | 277 | -- | Basswood | 738 | 0.1 |
| Cedar | 35,919 | 5.3 | Oak | 607 | 0.1 |
| Yellow cypress | 5,198 | 0.8 | Other | 3,235 | 0.5 |
| Other | 1,626 | 0.2 | | | |
| Total | 533,734 | 79.3 | Total | 139,426 | 20.7 |
| | | | Grand total | 673,160 | 100.0 |

Source: Same as in Table 3.2.

TABLE 3.6. Primary Forest Harvest by Province – Five-year Averages

| | 1949 - 53 | 1954 - 58 | 1959 - 63 | 1964 - 68 | 1969 - 73 |
|---|-------------------------|-----------|-----------|-----------|-----------|
| | thousands of cubic feet | | | | |
| Newfoundland | 109,409 | 99,776 | 97,017 | 93,158 | 95,223 |
| Prince Edward Island | 10,551 | 10,051 | 8,629 | 6,199 | 7,099 |
| Nova Scotia | 115,282 | 103,871 | 90,583 | 110,955 | 118,336 |
| New Brunswick | 216,941 | 202,243 | 178,426 | 209,056 | 258,567 |
| Quebec | 982,783 | 956,915 | 892,151 | 969,584 | 1,068,333 |
| Ontario | 528,145 | 527,040 | 524,279 | 587,174 | 635,668 |
| Manitoba | 67,491 | 59,322 | 45,868 | 40,081 | 66,918 |
| Saskatchewan | 70,696 | 55,077 | 45,690 | 52,043 | 98,622 |
| Alberta | 119,355 | 113,797 | 133,411 | 124,672 | 216,155 |
| British Columbia | 861,266 | 1,045,626 | 1,271,444 | 1,585,040 | 2,120,821 |
| Yukon and Northwest Territories | 3,945 | 4,787 | 3,685 | 3,588 | 113,230 |
| Canada | 3,085,864 | 3,178,505 | 3,291,183 | 3,781,550 | 4,798,972 |

Source: Catalogue 25-202, *Canadian Forestry Statistics*.

TABLE 3.7. Primary Depletion of Forest Resources – Five-year Averages

| | Volume cut | Fire losses | Total depletion | |
|---------------------|------------------------|-------------|-----------------|--------------------------------|
| | millions of cubic feet | | | millions of acres ¹ |
| 1949 - 53 | 3,086 | 219 | 3,305 | 2.1 |
| 1954 - 58 | 3,179 | 354 | 3,533 | 2.2 |
| 1959 - 63 | 3,291 | 666 | 3,957 | 2.5 |
| 1964 - 68 | 3,782 | 388 | 4,170 | 2.6 |
| 1969 - 73 | 4,456 | 344 | 4,800 | 3.0 |

¹ Approximately 1,600 cubic feet of wood per acre.

Source: Same as in Table 3.6.

TABLE 3.8. Selected Forestry Indicators

| | Production | Imports | Exports | Harvested area ¹ | Total apparent supply ² | Consumption per household | |
|------------------|------------------------|---------|---------|-----------------------------|------------------------------------|---------------------------|--------------------|
| | millions of cubic feet | | | thousands of acres | millions of cubic feet | cubic feet ³ | trees ⁴ |
| Softwood lumber: | | | | | | | |
| 1951 | 1,016 | 12 | 519 | 635 | 509 | 149 | 10 |
| 1956 | 1,150 | 27 | 606 | 719 | 571 | 146 | 10 |
| 1961 | 1,234 | 23 | 762 | 771 | 495 | 109 | 7 |
| 1966 | 1,583 | 24 | 893 | 1,016 | 714 | 138 | 9 |
| 1971 | 1,939 | 25 | 1,324 | 1,212 | 640 | 108 | 7 |
| 1973 | 2,361 | 41 | 1,552 | 1,475 | 850 | 136 | 9 |
| Hardwood lumber: | | | | | | | |
| 1951 | 98 | 9 | 28 | 61 | 79 | 23 | 2 |
| 1956 | 87 | 18 | 20 | 54 | 85 | 22 | 1 |
| 1961 | 81 | 18 | 19 | 51 | 80 | 18 | 1 |
| 1966 | 108 | 21 | 38 | 68 | 91 | 18 | 1 |
| 1971 | 87 | 16 | 28 | 54 | 75 | 12 | 1 |
| 1973 | 119 | 22 | 28 | 74 | 113 | 18 | 1 |
| Newsprint: | | | | | | | |
| 1951 | 631 | — | 580 | 394 | 51 | 16 | 1 |
| 1956 | 732 | — | 677 | 457 | 55 | 14 | 1 |
| 1961 | 762 | — | 710 | 476 | 52 | 11 | 1 |
| 1966 | 968 | — | 888 | 605 | 80 | 15 | 1 |
| 1971 | 967 | — | 885 | 605 | 82 | 14 | 1 |
| 1973 | 1,046 | — | 953 | 654 | 93 | 15 | 1 |

¹ Production divided by 1,600 cubic feet per acre.

² Production plus imports, minus exports.

³ Total apparent supply divided by the number of households.

⁴ Consumption per household in cubic feet divided by 15 cubic feet per tree.

Source: Catalogue 35-204, *Sawmills, Planing Mills and Shingle Mills*; Catalogue 36-204, *Pulp and Paper Mills*; Catalogue 65-202, *Exports*.

TABLE 3.9. Exports of Pulp and Paper by Type of Product

| | News-print | Printing paper | Fine paper | Tissue and sanitary paper | Wrapping paper | Paper-board | Pulp | Total | Total volume exported |
|----------------|------------|----------------|------------|---------------------------|----------------|-------------|------|-------|------------------------|
| | per cent | | | | | | | | millions of cubic feet |
| 1951 | 62.0 | 0.4 | 0.1 | 0.1 | 0.3 | 1.1 | 36.0 | 100.0 | 946 |
| 1956 | 63.2 | 0.5 | — | — | 0.3 | 1.0 | 35.0 | 100.0 | 1,066 |
| 1961 | 60.0 | 0.5 | 0.2 | — | 0.7 | 0.9 | 37.7 | 100.0 | 1,186 |
| 1966 | 57.0 | 1.2 | 0.3 | 0.1 | 0.6 | 1.7 | 39.0 | 100.0 | 1,552 |
| 1971 | 46.6 | 1.9 | 0.4 | 0.1 | 1.4 | 1.7 | 47.8 | 100.0 | 1,901 |
| 1973 | 44.4 | 1.6 | 0.7 | 0.2 | 2.6 | 2.2 | 48.3 | 100.0 | 2,146 |

Conversion Factors

| Product unit | Roundwood conversion in cubic feet |
|-------------------------------------|------------------------------------|
| Newsprint | thousands of tons |
| Softwood lumber | millions of bd. ft. |
| Hardwood lumber | millions of bd. ft. |
| Printing paper | thousands of tons |
| Fine paper | thousands of tons |
| Tissue and sanitary paper | thousands of tons |
| Wrapping paper | thousands of tons |
| Paperboard | thousands of tons |
| Pulp (D and A) | thousands of tons |
| Pulp (other) | thousands of tons |
| | 113.5 per ton |
| | 158 per thousand bd. ft. |
| | 189 per thousand bd. ft. |
| | 136.5 per ton |
| | 136.5 per ton |
| | 177.7 per ton |
| | 187.9 per ton |
| | 99.2 per ton |
| | 220.0 per ton |
| | 156 per ton |

Source: Catalogue 65-202, *Exports*.

CHAPTER IV

FISHERIES

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FISHERIES

One of Canada's earliest industries was fishing. By the early 1500's, the news of great numbers of codfish in the waters off eastern North America had attracted fishermen from a host of nations.

The importance of the marine resource as a major source of protein in a food-short world is becoming increasingly clear. Canada, therefore, has a signal responsibility to manage and maintain the valuable fish, mollusc and crustacean communities found on this nation's continental margins.

The abundance and variety of marine life on Canada's continental shelves can be attributed to a variety of natural processes acting in harmony. The major requirement for large concentrations of fish is food supply, usually in the form of zooplankton, phytoplankton and other micro-organisms. The presence of this basic resource allows the existence of a vertically linked food chain, running from the micro-invertebrates through larger invertebrates such as shrimp and squid, to small and, finally, large species of fish. In most instances, however, it is the larger, economically harvestable fish varieties that man, the consumer, is most concerned with.

The existence of sufficiently large volumes of plankton depends on local area conditions. Phytoplankton development is limited by the light energy that is available for photosynthesis and by the amount of phosphorous and nitrogen nutrients. Currents that produce upwellings of these nutrients from bottom sediments stimulate the growth of phytoplankton in upper ocean layers where light is available. The bottom substratum is also important in determining the level of biological activity in this process. A rocky, topographically varied bottom will allow fewer nutrients to be moved than a gently sloping silt-covered shelf. Too muddy a bottom, however, may result in insufficient amounts of oxygen being present for bottom-dwelling species due to its depletion by the organic decomposition process. Depth of water and temperature are also important for the development of fertile marine environments. Water depth determines, to a degree, the amount of nutrients that are brought up from the bottom. In addition, if the foregoing conditions for ensuring an adequate food supply are met, shallow areas tend to support large populations of bottom-dwelling species. Organisms, especially bottom dwellers, usually have shorter life spans at higher temperatures. Decomposition also takes place more rapidly as temperature increases. Again, the result may be oxygen depletion in the bottom layer of water.

Large areas of continental shelf on the Atlantic and Pacific margins of Canada meet the necessary biological requirements to support large populations of ma-

rine life; indeed, the Grand Banks of Newfoundland meet them so well that it is considered possibly the most productive of the world's fishing grounds. As a result, the area has been subjected to several hundred years of extensive exploitation by foreign and Canadian fishing fleets.

Marine life has historically been viewed as an inexhaustible resource, but the pressures placed upon the resource by modern fishing techniques have proven that this is not the case. Exhaustion of existing stocks caused the Pacific Coast herring catch to drop to levels a fraction of their former size by the late 1960's (see Table 4.3). In the North Atlantic, extreme pressure has been imposed on stocks of already scarce halibut and haddock by nature of their economic value. The measures for conservation of fish stocks, especially in international waters, have had few teeth to ensure that catch and type limitations are being followed, a problem compounded by the fact that each country has, in the past, been responsible for much of the policing of its own fleet under the regulations of the International Commission for the North Atlantic Fisheries.

A major factor encountered in marine resource conservation is the proliferation of technological improvements which increase capture levels. In the past, it has been difficult to convince an industry concerned primarily with maximizing returns within limits set essentially for that group's benefit that a real need exists to allow stocks to replenish themselves. The method of vacuuming the oceans of nearly all swimming life over large areas has undoubtedly been one example of the short-sighted attitude prevailing in some parts of the international fishing industry. However, while these foreign nations tend to exploit a wide range of species, thereby spreading out the impact in some measure, domestic efforts concentrate mostly on a few scarce, high-value species. Tables 4.2 and 4.3 illustrate Canadian fish landings by species and point up the degree of concentration. In 1974, four species comprised 83% of total Atlantic Coast fish landings by weight. On the Pacific Coast, only two species made up 83% of total fish landings the same year.

Fishing in Canada has traditionally been a labour-intensive, small-scale operation for the most part, especially in areas where for many years inshore fishermen were unable to accumulate capital to allow an increase in the scale of operations. Limitations in fish handling and preserving, of course, also restricted the size of the market served. Tables 4.4 and 4.5 indicate, however, that although the number of marine fishermen in the industry has remained relatively constant for the past 20 years, the number of large fishing vessels in service has risen significantly. This move to more capital-intensive operations is in part a response to the competition with foreign fleets for the available resource. Canadian

catches, as a result, rose steadily until the late 1960's, when the pressures of overfishing produced painfully evident results.

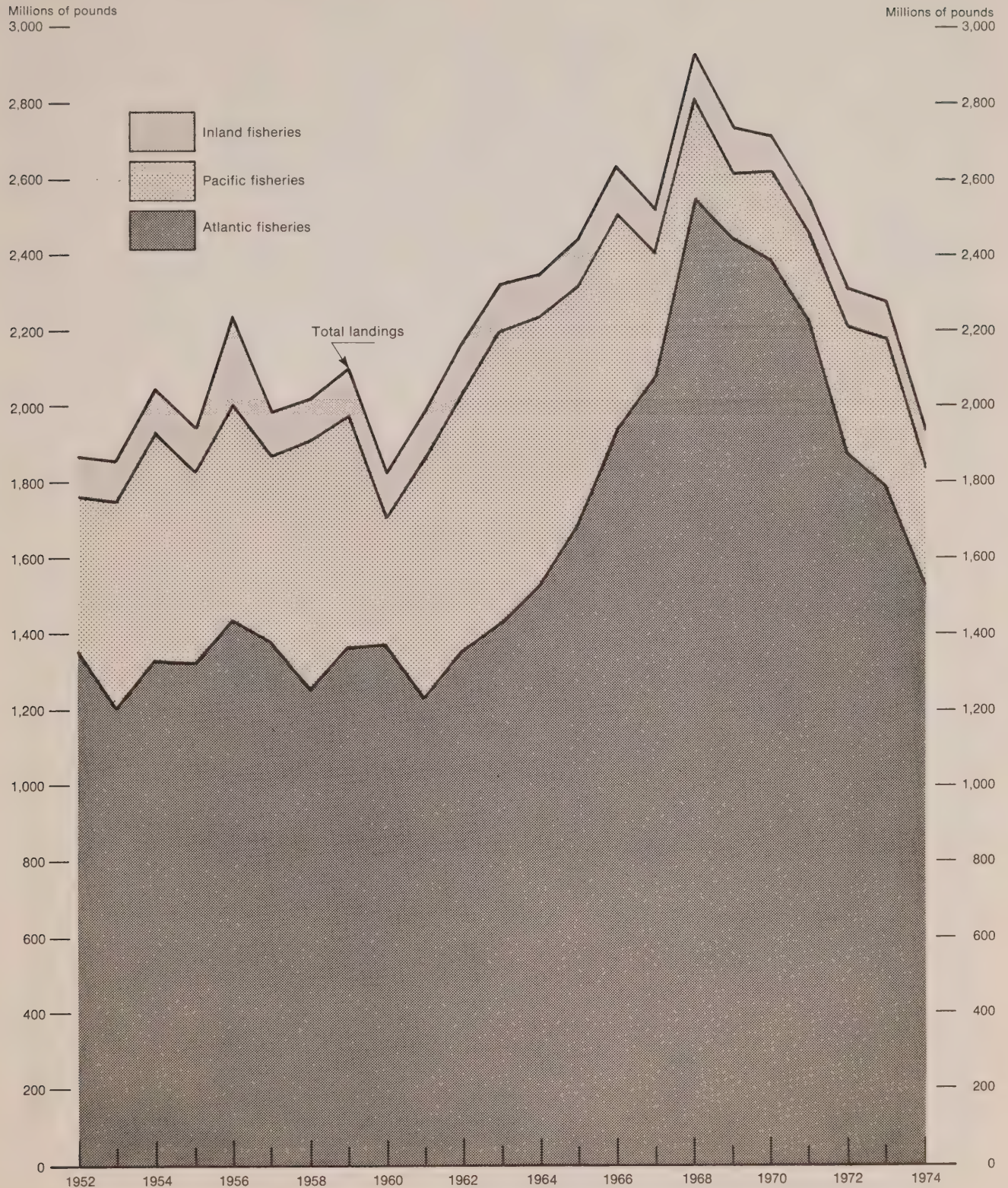
Continued pollution of the ocean and inland lakes and rivers has also produced adverse effects on the marine environment. Mercury poisoning from contaminated fish was first recognized as a very serious problem in the Minimata, Japan incident a number of years ago. Since that time, the ocean fishery for swordfish has been curtailed due to mercury pollution and commercial

operations in many inland areas of Canada have been stopped due to similar problems.

Hope exists for a rational operation of the fishing industry in Canada. The new 200-mile zone of economic control over the continental shelves which Canada implemented on January 1, 1977, should allow this country better control over this valuable resource. Most important, it must be viewed as an opportunity to rebuild for the future a resource that has been seriously depleted.

Chart -- 4.1

Canadian Fish Landings by Region



Source: Catalogue 24-201, FISHERIES STATISTICS OF CANADA.

TABLE 4.2. Canadian Fish Landings by Species, Atlantic Coast

| | 1957 | 1961 | 1966 | 1971 | 1973 | 1974 |
|--|--------------------|--------------|----------------|----------------|----------------|--------------|
| | millions of pounds | | | | | |
| Groundfish: | | | | | | |
| Cod ¹ | 641.8 | 516.9 | 563.1 | 449.2 | 324.5 | 287.9 |
| Haddock ¹ | 131.6 | 118.4 | 112.8 | 53.6 | 33.5 | 27.2 |
| Redfish ² | 46.3 | 56.2 | 183.1 | 248.6 | 349.3 | 193.3 |
| Halibut ³ | 7.6 | 6.1 | 4.6 | 3.3 | 2.7 | 2.5 |
| Plaice, flounders ² | 86.5 | 107.3 | 224.2 | 282.4 | 269.3 | 217.7 |
| Turbot ¹ | 1.3 | 1.4 | 30.8 | 22.9 | 16.9 | 15.2 |
| Pollock ¹ | 36.8 | 49.7 | 34.6 | 22.1 | 50.0 | 46.2 |
| Other | 34.1 | 29.3 | 48.7 | 56.0 | 52.2 | 48.8 |
| Total | 986.0 | 885.3 | 1,201.9 | 1,138.1 | 1,098.4 | 838.8 |
| Pelagic and estuarial: | | | | | | |
| Herring ² | 222.3 | 193.3 | 569.9 | 924.4 | 499.0 | 497.4 |
| Mackerel ² | 19.7 | 14.1 | 25.7 | 32.9 | 47.7 | 36.7 |
| Swordfish ³ | 5.2 | 3.2 | 7.4 | — | — | — |
| Tuna ³ | 0.1 | 0.1 | 0.4 | 6.8 | 14.0 | 13.9 |
| Salmon ² | 3.0 | 3.5 | 5.2 | 4.0 | 4.8 | 4.9 |
| Other | 44.8 | 24.5 | 26.8 | 22.5 | 34.0 | 54.6 |
| Total | 295.1 | 238.7 | 635.4 | 990.6 | 599.5 | 607.5 |
| Molluscs and crustaceans: | | | | | | |
| Oysters | 3.7 | 4.1 | 3.5 | 2.7 | 2.3 | 2.8 |
| Scallops ⁴ | 3.3 | 10.5 | 18.2 | 11.2 | 11.1 | 14.0 |
| Lobsters | 44.4 | 47.5 | 37.3 | 38.2 | 35.6 | 31.4 |
| Crabs | — | — | — | 15.4 | 22.4 | 23.4 |
| Other | 13.4 | 24.0 | 17.3 | 21.1 | 15.7 | 14.6 |
| Total | 64.8 | 86.1 | 76.3 | 88.6 | 87.1 | 86.2 |

¹ Weighed gutted, head on.

² Weighed round, that is fresh, uncleaned.

³ Weighed gutted, head off.

⁴ Weighed shucked from shell.

Source: Same as in Chart 4.1.

TABLE 4.3. Canadian Fish Landings by Species, Pacific Coast

| | 1957 | 1961 | 1966 | 1971 | 1973 | 1974 |
|--------------------------------|---|--------------|--------------|--------------|--------------|--------------|
| | millions of pounds, common landed form ¹ | | | | | |
| Groundfish: | | | | | | |
| Halibut ² | 25.0 | 29.5 | 32.0 | 25.3 | 14.5 | 7.4 |
| Sole | 8.0 | 6.1 | 10.5 | 10.7 | 6.8 | 7.2 |
| Cod | 13.4 | 9.3 | 27.8 | 13.6 | 18.0 | 20.2 |
| Other | 0.3 | 0.4 | 0.3 | 2.5 | 3.0 | 1.4 |
| Total | 46.7 | 45.3 | 70.6 | 52.1 | 42.3 | 36.2 |
| Pelagic and estuarial: | | | | | | |
| Herring | 295.4 | 448.4 | 162.9 | 22.1 | 122.6 | 98.5 |
| Salmon | 131.9 | 121.6 | 307.7 | 132.4 | 185.2 | 134.2 |
| Other | 4.3 | 8.7 | 12.5 | 10.6 | 22.6 | 13.0 |
| Total | 431.6 | 578.7 | 483.1 | 165.1 | 330.4 | 245.7 |
| Molluscs and crustaceans: | | | | | | |
| Clams | 3.8 | 2.3 | 2.5 | 2.5 | 1.6 | 2.4 |
| Crabs | 3.0 | 4.6 | 4.5 | 2.0 | 2.6 | 2.5 |
| Oysters | 5.1 | 6.4 | 12.4 | 6.3 | 9.9 | 8.1 |
| Shrimps and prawns | 1.6 | 1.2 | 1.7 | 0.7 | 1.7 | 2.7 |
| Other | — | — | — | 0.1 | 0.2 | 0.1 |
| Total | 13.5 | 14.5 | 21.1 | 11.6 | 16.0 | 15.8 |

¹ Form in which the species of fish involved is most commonly weighed.

² Includes halibut landed in United States ports by Canadian fishermen.

Source: Same as in Chart 4.1.

TABLE 4.4. Primary Employment in Fishing

| | Number of persons employed | | |
|----------------|----------------------------|--------|--------|
| | Sea | Inland | Total |
| 1951 | 47,740 | 17,448 | 65,188 |
| 1961 | 61,457 | 16,903 | 78,360 |
| 1962 | 62,134 | 16,684 | 78,818 |
| 1963 | 64,377 | 17,305 | 81,682 |
| 1964 | 61,879 | 16,246 | 78,125 |
| 1965 | 62,335 | 15,822 | 78,157 |
| 1966 | 57,918 | 15,328 | 73,246 |
| 1967 | 57,327 | 13,923 | 71,250 |
| 1968 | 57,842 | 13,743 | 71,585 |
| 1969 | 53,873 | 11,110 | 64,983 |
| 1970 | 53,404 | 9,545 | 62,949 |
| 1971 | 50,741 | 8,104 | 58,845 |
| 1972 | 49,643 | .. | .. |

Source: Same as in Chart 4.1.

TABLE 4.5. Canadian Vessels Involved in Marine Fisheries

| | Atlantic | | |
|----------------|-------------------|----------------|---------------|
| | Under 10 tons | 10 - 99.9 tons | Over 100 tons |
| | number of vessels | | |
| 1963 | 35,393 | 2,060 | 179 |
| 1964 | 35,798 | 2,172 | 195 |
| 1965 | 36,757 | 2,373 | 237 |
| 1966 | 33,752 | 2,498 | 273 |
| 1967 | 32,458 | 2,569 | 333 |
| 1968 | 31,194 | 2,703 | 361 |
| 1969 | 29,254 | 2,796 | 356 |
| 1970 | 29,113 | 2,905 | 365 |
| 1971 | 28,402 | 2,949 | 351 |
| 1972 | 25,409 | 3,152 | 321 |
| 1973 | .. | .. | .. |
| 1974 | .. | .. | .. |
| | Pacific | | |
| | Under 10 tons | 10 - 99.9 tons | Over 100 tons |
| | number of vessels | | |
| 1963 | .. | .. | .. |
| 1964 | .. | .. | .. |
| 1965 | .. | 1,484 | 113 |
| 1966 | 5,337 | 1,926 | 79 |
| 1967 | 5,515 | 2,160 | 95 |
| 1968 | 5,386 | 2,206 | 94 |
| 1969 | 4,827 | 2,273 | 81 |
| 1970 | 4,576 | 2,321 | 78 |
| 1971 | 4,272 | 2,359 | 67 |
| 1972 | 4,252 | 2,344 | 74 |
| 1973 | 4,174 | 2,334 | 81 |
| 1974 | 4,402 | 2,586 | 96 |

Source: Same as in Chart 4.1.

TABLE 4.6. Catches of All Species in the Northwest Atlantic by Selected Nations

| | 1961 | 1966 | 1971 | 1974 |
|---------------------------------------|---------------------------------------|--------------|--------------|--------------|
| | metric tons, round fresh ¹ | | | |
| Canada | 655 | 997 | 1 105 | 845 |
| Denmark | 104 | 124 | 73 | 71 |
| France | 180 | 152 | 56 | 39 |
| Federal Republic of Germany | 174 | 178 | 134 | 83 |
| German Democratic Republic | ... | 95 | 142 | 131 |
| Norway | 49 | 43 | 35 | 59 |
| Poland | 4 | 72 | 270 | 215 |
| Portugal | 197 | 202 | 153 | 145 |
| Spain | 208 | 240 | 269 | 184 |
| Soviet Union | 341 | 841 | 1 022 | 1 157 |
| United States | 441 | 968 | 979 | 1 029 |
| Other | 48 | 70 | 108 | 89 |
| Total | 2 401 | 3 982 | 4 346 | 4 047 |

¹ Round refers to fish in whole, i.e., uncleaned, not gutted form.

Source: *International Commission for Northwest Atlantic Fisheries*, Statistical Bulletin, Vol. 24, 1974.



Filleting fish, Gaspé, Quebec (photo by Tony Friend)

CHAPTER V

TRANSPORTATION

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TRANSPORTATION

Technological improvements in transport vehicles that use fossil fuels have effectively shrunk man's world so that today he can cross whole continents in equivalent time and with considerably less effort than it took his ancestors to journey to the next town two centuries ago. Not only have these improvements resulted in decreased travel time, but they have permitted a many-fold increase in the number of movements of people and goods. These many trips, plus the required supporting infrastructure, have made transport activity one of the most visible of the various stresses man places on the environment.

The need to improve and expand transportation systems will continue in future, but greater care will probably be taken in systems planning. The single-minded economic efficiency criteria will increasingly give way to a "cost-benefit" approach where the objectives will be to minimize social and environmental stress. Environmental impact statements have in many cases become mandatory for large-scale projects, for example, the Mackenzie Valley Pipeline. Assessment of whole systems, however, is difficult and serious considerations of alternative (environmentally less harmful) systems have not gone much beyond public debate.

Environmental stress resulting from transportation activity tends to be generalized in nature and can rarely be described in direct cause and effect terms. The comments below touch on some of these general concerns.

Air Pollution

It is obvious that the exhaust products of the internal combustion engine contribute to the amount of hydrocarbons, nitrous oxides and carbon monoxide found in the ambient air of cities. The size of that contribution, however, is not easily ascertained, either in absolute terms or in comparison with the share attributable to industry or residential heating. The actual concentration of these gases in the atmosphere is in part a function of prevailing weather conditions. Regulations limiting the quantity of noxious exhaust gases discharged per vehicle may reduce the problem somewhat; efforts to reduce traffic density represent another approach to improving the situation.

Noise

Noise is an inevitable by-product of the use of machinery. The familiar car "muffler" was one of the first anti-noise-pollution devices required by law. The movement of vehicles is one of the major sources of noise and consequently the measurement of "noise shadows" (from airports, expressways, major arterials) is increasingly being recognized as an important tool for physical planning.

Spillage of Hazardous Substances

Spillage of hazardous substances is one of the major concerns in the control of environmental contamination. Transportation and storage is considered one of the primary sources of this type of pollution and new regulations are being implemented to minimize this risk. Nevertheless, the increase in volume of transportation and storage of these substances may mean that even with reduced risk per unit transported, the "spillage" in absolute terms may, in fact, increase.

Landform Transformation

Landform transformation is a phenomenon associated with construction of transportation networks and their terminals. Because of the scale of many of these operations, they often result in the total restructuring of local habitats. Although in terms of the country as a whole these "restructuring" processes may seem insignificant, they may have considerable impact on the quality of local environments and fragile ecosystems.

Energy Sources of Modern Transportation Systems

Energy sources of modern transportation systems are almost exclusively fossil fuels. A large part of the environmental stress originating from exploration, extraction, refining, storage and transportation of these fuels can be attributed directly to the demand for energy in transportation.

Physical Infrastructure, Networks and Stocks (Chart 5.1 to Table 5.22)

The statistical tabulations in this chapter are quantitative in nature rather than qualitative, and relate indirectly to the measurement of environmental stress attributable to transportation. These include data detailing the extension or growth of networks, growth of transport equipment stocks and parallel technical changes. The purpose of the data presented here is primarily to raise issues that can ultimately only be examined with more environmentally oriented data from other areas of research. In many cases, these data are not available.

The reader is cautioned to consult the source documents carefully in order to become familiar with the limitations of the data in this publication. For example, motor vehicle registrations are frequently used as a proxy for vehicle movements and fuel consumption estimates. The user must also be aware of a number of technical shortcomings, such as differences in definition and licensing practices between provinces and the possibility of a commercial vehicle being registered in several provinces.

Extensions of transportation networks into new areas are, in a sense, intrusions into “stable” ecosystems. Although they may in themselves create only minor disturbances, the indirect impact can have dramatic end results. The extension of railways into the Prairie grasslands in the late 19th and early 20th centuries and the subsequent settlement of these regions, are examples. Today, the expansion of networks is largely confined to providing access to resources in remote regions.

Density of networks may be considered a function of population, economic activity and transport technology. The tendency for an increasing proportion of the population to live in a few large, interconnected urban agglomerations (for example, the Windsor - Quebec Axis) is both a cause and an effect of high-density systems. Careful planning and control of transportation and utility corridors are required if the quality of the rural landscape between these cities is to be preserved.

Increases in the volume of traffic place stresses on the system itself and, until recently, acceptable solutions for the provision of additional capacity have been largely dictated by engineering criteria. Today, however, social and environmental factors are becoming important terms of reference for planning and design. This is reflected in changes in urban expressway construction policy and renewed interests shown in the area of urban public transportation.

Improvements in technology have a major impact on the shifts in popularity of various transport modes. The underlying dynamics can be attributed to the drive for more efficient means for transporting goods and people which, in economic terms, can be expressed as reductions in cost/time per “ton mile” and cost/time per “passenger mile”. Technological change in one sphere tends to effect a set of responses in other spheres, such as the impact on urban development due to the spread of ownership of the private automobile.

Technological change is difficult to capture statistically, although it may be indirectly reflected in the data on the weight of aircraft (Table 5.22) and the increase in the average length of freight trains (Table 5.25). Specialization is also a reflection of technological change. The most striking example has been the growth of energy networks (Tables 5.9 and 5.10). In the 1960’s, improvement in electric transmission technology made it possible to tap distant hydro sources. Map 5.13 shows

some of the results of this technical breakthrough, with high-tension systems connecting the remote sources of hydro power of the Peace, Nelson, Churchill and Manicouagan Rivers with the population centers in the south.

Movement of Goods and People (Tables 5.23 to 5.36)

Statistics in this section measure the intensity of use of the transportation network and its terminals. Data on the movement of goods and people are only available for the organized public transportation systems. As a result, one of the major missing pieces of statistical information is that of the movement of people by private automobile. Even a rough calculation would show that this mode of transportation totally dominates in terms of the number of vehicle-miles travelled and energy consumed. If an average figure of 10,000 miles a year per passenger car is assumed, the corresponding number of miles travelled for the eight million passenger cars in Canada would be 80 billion miles. A second assumption (that the car on average carried two people) would provide a figure of 160 billion passenger miles. Compare this with the 16.7 billion passenger miles for airlines and 1.9 billion passenger miles for railways, which combined are less than 12% of those of the automobile.¹

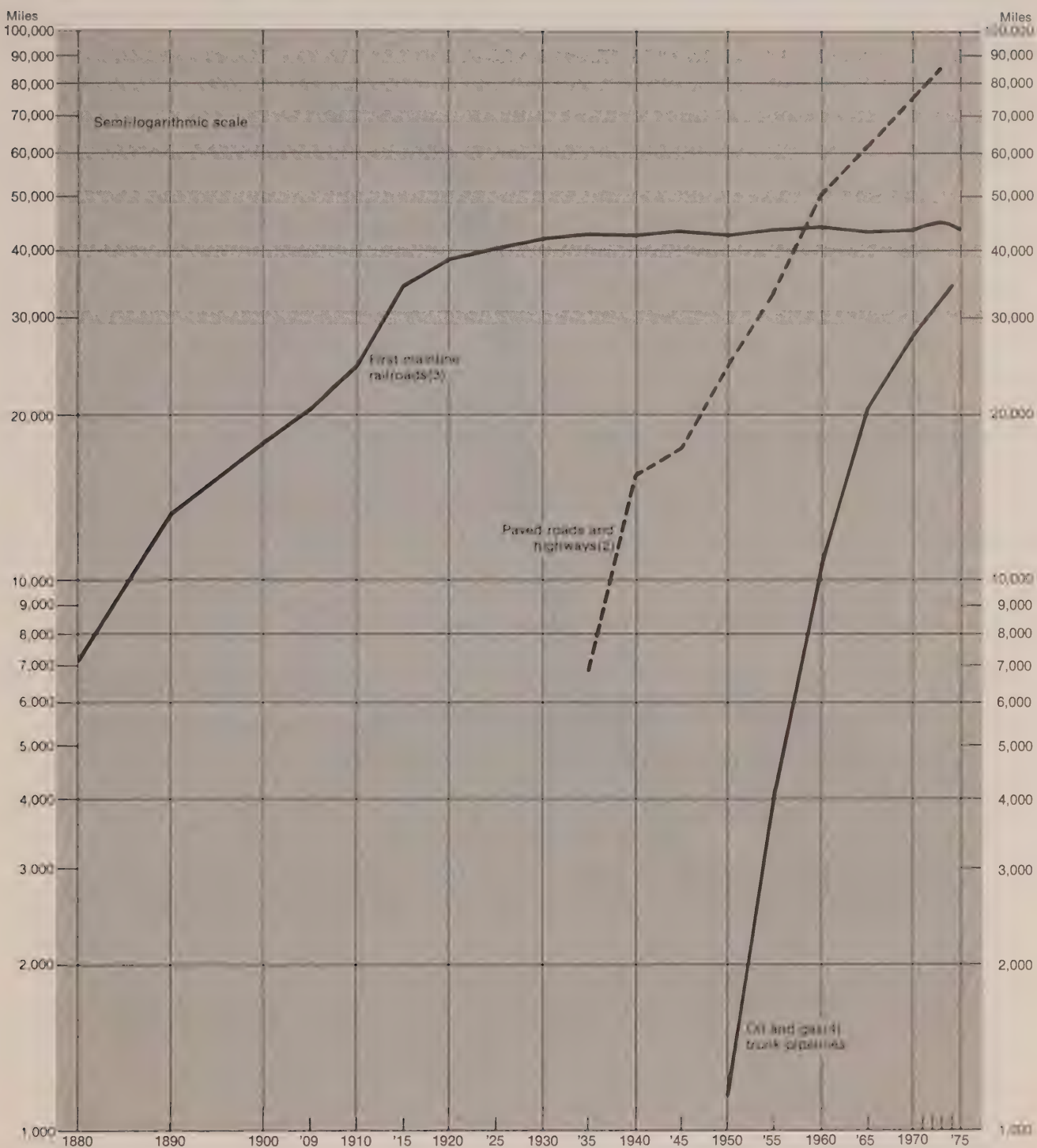
Evidence of the wasteful use of automobile travel is demonstrated in Table 5.33, which indicates that less than 10% of automobiles carry passengers other than the driver. The same table notes that less than 16% of workers take some form of public transport to work, although in highly urbanized areas, the latter figure is undoubtedly higher.

Another area where comprehensive data are lacking is that of the movement of goods by truck. Regular surveys in this area cover only those “for hire”, which account for less than 3% of all registered trucks. A major part of this universe consists of small pickup-type trucks.

The data on the movement of goods and people by rail and air are generally good and provide background data on the flow of aggregate movements.

¹ These are assumptions for the sake of argument only and in no way reflect available “hard” data.

Chart — 5.1

Railroad, Road and Pipeline Mileage(1)

(1) Data are presented from earliest possible year; semi-log scale is employed to allow comparisons of rates of growth.

(2) Does not include urban streets.

(3) First mainline is mileage between stations only, i.e., does not include sidings and switching yards.

(4) Major point to point lines only, does not include collectors from fields.

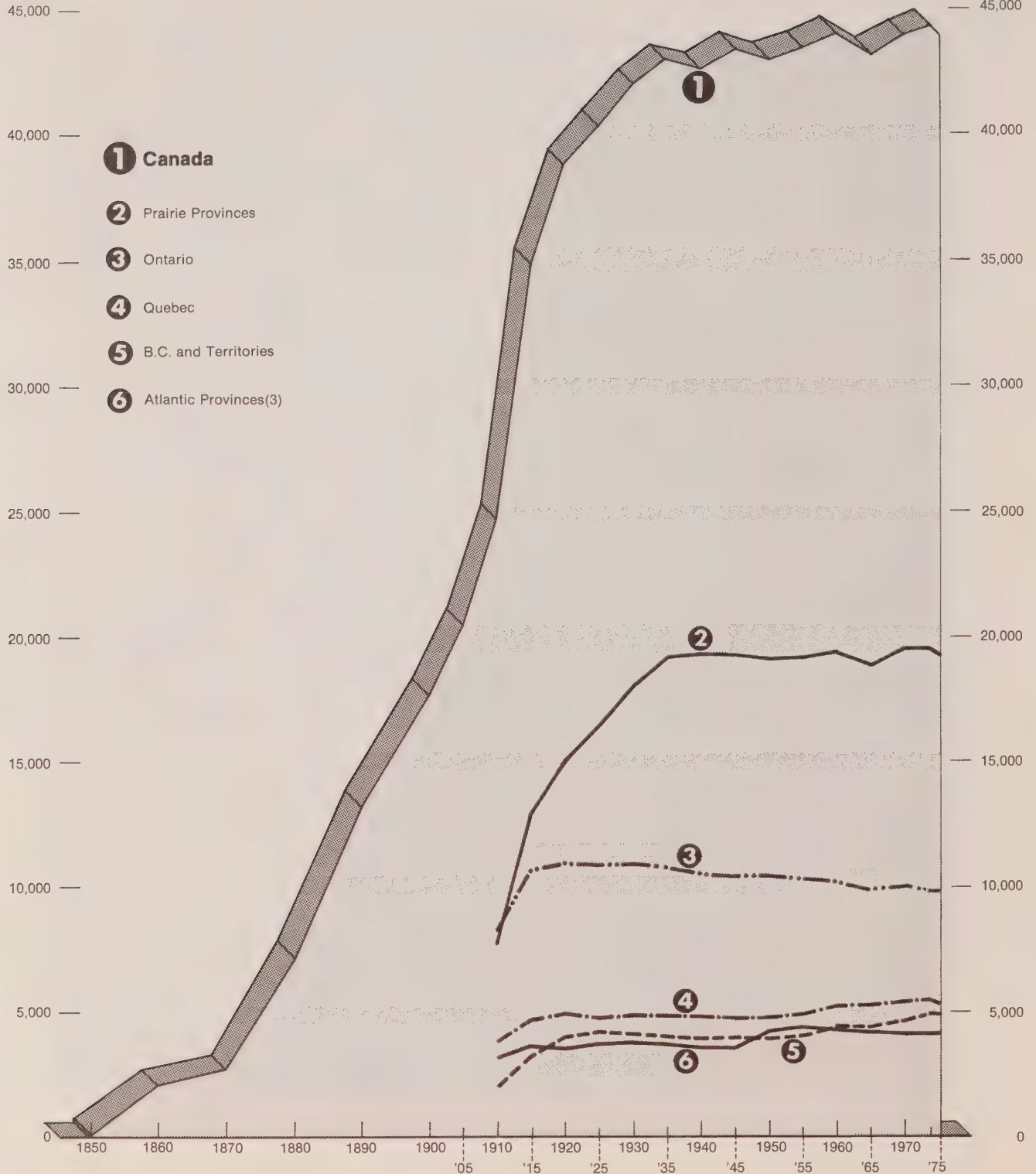
Source: Catalogue 53-201, ROAD AND STREET MILEAGE; Catalogue 55-201, OIL AND PIPELINE TRANSPORT; Catalogue 52-209, RAILWAY TRANSPORT, PART 3; unpublished data from Manufacturing and Primary Industries Division, Statistics Canada.

Chart — 5.2

Mainline Railroad Track(1) by Region(2)

Miles of track
45,000 —

Miles of track
45,000 —



(1) Mainline or first main track is defined as a single track extending the entire distance between terminals upon which the length of the line is based.

(2) Data were not available on a regional basis before 1910.

(3) Newfoundland included after 1949.

Source: Catalogue 52-209, RAILWAY TRANSPORT, PART III.

TABLE 5.3. Road and Highway Mileage¹

| | Paved roads | Expressways ² | All roads ³ | Percentage of road ³ miles paved |
|-----------------------------|-------------|--------------------------|------------------------|--|
| | miles | | | |
| 1935 | 6,848 | .. | 410,808 | 1.7 |
| 1940 | 15,594 | .. | 499,191 | 3.1 |
| 1945 | 17,440 | .. | 491,380 | 3.5 |
| 1950 | 24,519 | .. | 567,155 | 4.3 |
| 1955 | 33,240 | .. | 455,404 | 7.3 |
| 1960 | 50,119 | .. | 421,448 | 11.9 |
| 1965 | 61,631 | 847 ⁴ | 448,378 | 13.7 |
| 1970 | 75,647 | 1,680 | 460,422 | 16.4 |
| 1973 ⁵ | 85,098 | 2,057 ⁶ | 482,460 | 17.6 |

¹ Does not include urban streets.

² For details see Table 5.6.

³ Total road miles vary greatly over time due, in part, to changes in definitions by the reporting provinces. For this reason, paved roads are a more accurate measure of this transportation network. In addition, the majority of automobiles, especially in recent years, travel infrequently on unpaved roads.

⁴ Mileage for 1964.

⁵ The 1973 data are from the Roads and Transportation Association of Canada.

⁶ Mileage for 1972.

Source: Catalogue 53-201, *Road and Street Mileage and Expenditure*; Roads and Transportation Association of Canada, *Nation on the Move*.



Fraser Street Car Dump, Vancouver (N.F.B. Phototheque, photo by Tony Scammell)





TABLE 5.6. Expressways¹

| | 1964 | 1970 | 1972 | 1975 |
|--------------------------------|-------|-------|-------|-------|
| | miles | | | |
| Newfoundland | — | — | — | 7 |
| Prince Edward Island | — | — | — | — |
| Nova Scotia | — | — | — | 34 |
| New Brunswick | — | — | 4 | 25 |
| Quebec | 150 | 567 | 872 | 1,137 |
| Ontario | 522 | 737 | 762 | 1,057 |
| Manitoba | 45 | 138 | 169 | 220 |
| Saskatchewan | 6 | 6 | 10 | 280 |
| Alberta | 49 | 131 | 139 | 395 |
| British Columbia | 75 | 101 | 101 | 103 |
| Canada | 847 | 1,680 | 2,057 | 3,258 |

¹ Includes divided, controlled access highways with four or more lanes. They may be maintained by either federal or provincial governments.

Source: Roads and Transportation Association of Canada, *Nation on the Move*.

TABLE 5.7. Paved Roads and Highways by Region

| | Atlantic provinces ¹ | Quebec | Ontario | Prairie provinces | British Columbia, Yukon and Northwest Territories |
|-----------------------------|---------------------------------|--------|---------|-------------------|---|
| | miles | | | | |
| 1935 | 361 | 1,235 | 4,008 | 565 | 679 |
| 1940 | 2,077 | 3,866 | 6,847 | 1,345 | 1,459 |
| 1945 | 2,207 | 4,483 | 7,709 | 1,434 | 1,607 |
| 1950 | 2,848 | 6,433 | 10,102 | 2,749 | 2,387 |
| 1955 | 3,735 | 8,995 | 11,515 | 5,657 | 3,338 |
| 1960 | 6,036 | 13,804 | 16,372 | 8,761 | 5,146 |
| 1965 | 8,060 | 14,389 | 21,518 | 12,289 | 5,375 |
| 1970 | 9,276 | 16,387 | 24,398 | 18,269 | 7,317 |
| 1973 ² | 10,925 | 17,479 | 26,453 | 21,732 | 8,509 |

¹ Newfoundland included after 1949.

² The 1973 data is from the Roads and Transportation Association of Canada.

Source: Same as in Table 5.3.

TABLE 5.8. Air Travel Between Major Canadian Metropolitan Centres¹

| City pair | 1968 | 1970 | 1974 | 1975 |
|---------------------------------|-------------------------|-------|---------|---------|
| | thousands of passengers | | | |
| Montréal - Toronto | 725.4 | 898.4 | 1,232.0 | 1,165.8 |
| Rank | 1 | 1 | 1 | 1 |
| Ottawa - Toronto | 269.8 | 359.5 | 581.5 | 583.6 |
| Rank | 2 | 2 | 2 | 2 |
| Toronto - Vancouver | 161.9 | 223.8 | 422.1 | 435.8 |
| Rank | 4 | 4 | 3 | 3 |
| Calgary - Edmonton | 181.2 | 239.8 | 386.8 | 421.3 |
| Rank | 3 | 3 | 4 | 4 |
| Calgary - Vancouver | 141.3 | 195.9 | 316.6 | 342.1 |
| Rank | 6 | 6 | 5 | 5 |
| Edmonton - Vancouver | 128.1 | 169.0 | 278.7 | 287.8 |
| Rank | 7 | 7 | 7 | 6 |
| Toronto - Winnipeg | 153.1 | 207.2 | 281.3 | 285.4 |
| Rank | 5 | 5 | 6 | 7 |
| Calgary - Toronto | 88.2 | 111.4 | 204.4 | 221.7 |
| Rank | 11 | 11 | 8 | 8 |
| Halifax - Toronto | 77.1 | 107.6 | 171 | 182.3 |
| Rank | 15 | 13 | 12 | 9 |
| Montréal - Vancouver | 83.8 | 112.5 | 197.2 | 176.1 |
| Rank | 13 | 10 | 9 | 10 |
| Edmonton - Toronto | 70.1 | 92.2 | 162.5 | 175.3 |
| Rank | 17 | 16 | 13 | 11 |
| Montréal - Québec | 111.5 | 136.8 | 181.9 | 171.9 |
| Rank | 9 | 9 | 11 | 12 |
| Ottawa - Montréal | 115.1 | 146.6 | 194 | 169.2 |
| Rank | 8 | 8 | 10 | 13 |
| Thunder Bay - Toronto | 69.9 | 92.2 | 152.8 | 159.9 |
| Rank | 18 | 17 | 15 | 14 |
| Vancouver - Winnipeg | 78.6 | 108.9 | 153.1 | 159.3 |
| Rank | 14 | 12 | 14 | 15 |

¹ Includes domestic portions of international journeys.

Source: Catalogue 51-204, *Air Passenger Origin and Destination, Domestic Report* (1968, 1970, 1974 and 1975).

TABLE 5.9. Miles of Oil and Natural Gas Pipelines

| | Trunk Lines ¹ | | | Product lines ² | | | Total |
|----------------|--------------------------|-------------|--------|----------------------------|-------------|-------|--------|
| | Oil | Natural gas | Total | Oil | Natural gas | Total | |
| | miles | | | | | | |
| 1950 | 1,158 | .. | 1,158 | .. | .. | .. | 1,158 |
| 1955 | 4,192 | .. | 4,192 | .. | .. | .. | 4,192 |
| 1960 | 4,473 | 6,301 | 10,774 | 1,189 | 462 | 1,651 | 12,425 |
| 1965 | 6,565 | 14,206 | 20,771 | 1,695 | 467 | 2,162 | 22,933 |
| 1970 | 8,756 | 19,282 | 28,038 | 1,782 | 390 | 2,172 | 30,210 |
| 1974 | 9,324 | 25,107 | 34,431 | 2,305 | 328 | 2,633 | 37,064 |

¹ Trunk lines are defined as the main transporting lines for unrefined oil or natural gas.

² Product lines are defined as lines built to carry refined products such as gasoline or fuel oil.

Source: Catalogue 55-201, *Oil Pipeline Transport*; unpublished data, Manufacturing and Primary Industries Division, Statistics Canada.

TABLE 5.10. Electric Transmission Circuit Mileage by Power Line Voltage¹

| Power line voltage | 1956 | 1961 | 1966 | 1971 | 1973 | 1974 |
|--|------------------|--------------------|---------------|---------------|---------------|----------------|
| | miles | | | | | |
| 20- 99 kilovolts | 37,609 | 41,160 | 44,457 | 49,001 | 48,794 | 49,316 |
| 100-199 " | 12,905 | 16,723 | 20,793 | 25,079 | 25,907 | 26,225 |
| 200-299 " | 4,397 | 5,752 | 8,220 | 14,690 | 15,692 | 15,963 |
| 300-399 " | 911 ² | 2,330 ² | 2,710 | 3,610 | 3,893 | 4,168 |
| 400-599 " | .. | .. | 436 | 1,572 | 2,699 | 2,908 |
| 600 kilovolts and over | .. | .. | 623 | 1,223 | 2,531 | 2,508 |
| Total transmission circuit mileage. | 55,822 | 65,965 | 77,239 | 95,175 | 99,516 | 101,088 |

¹ The right of way swath cut for power lines varies directly with the voltage that line carries. The following table presents some indication of the right of way sizes involved:

| | Single line | | Double line | |
|-----------------------|-----------------------|--|-----------------------|--|
| | Width of right of way | Acres of right of way for one mile of line | Width of right of way | Acres of right of way for one mile of line |
| | feet | | feet | |
| 69 kilovolts. | 100 | 12 | 125 | 15 |
| 161 " | 125 | 15 | 175 | 21 |
| 345 " | 150 | 18 | 175 | 21 |
| 500 " | 200 | 24 | 200 | 24 |

² Includes all lines 300 kilovolts and over for 1956 and 1961.

Source: Catalogue 57-202, *Electric Power Statistics*; United States Federal Power Commission, *Hydroelectric Power Evaluation*, Washington, D.C., March 1968.

TABLE 5.11. Electric Transmission Circuit Mileage by Region, 1973

| Power line voltage | Atlantic provinces | Quebec | Ontario | Prairie provinces | British Columbia | Yukon and Northwest Territories | Canada |
|--|--------------------|--------|---------|-------------------|------------------|---------------------------------|--------|
| | miles | | | | | | |
| 20-99 kilovolts | 4,940 | 3,911 | 9,947 | 25,946 | 3,675 | 375 | 48,794 |
| 100-199 " | 2,284 | 4,649 | 7,249 | 8,588 | 2,616 | 521 | 25,907 |
| 200-299 " | 1,035 | 2,037 | 7,450 | 3,808 | 1,362 | — | 15,692 |
| 300-399 " | 49 | 3,533 | 3 | — | 308 | — | 3,893 |
| 400-599 " | — | — | 435 | 1,113 | 1,151 | — | 2,699 |
| 600 kilovolts and over | — | 2,531 | — | — | — | — | 2,531 |
| Total transmission circuit mileage . . . | 8,308 | 16,661 | 25,084 | 39,455 | 9,112 | 896 | 99,516 |
| Percentage of Canadian total | 8.4 | 16.7 | 25.2 | 39.6 | 9.2 | 0.9 | 100.0 |

Source: Catalogue 57-202, *Electric Power Statistics* (1973).



Shipping Activity, St. Joseph de la Rive, Quebec (photo by Tony Friend)

**Hydro-power Line Right of Way Through Forested Land
Near Bancroft, Ontario**



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

TABLE 5.14. Airport Activity as Measured by the Number of Passengers and Length of Longest Runway, 1975

| Airport | Number of arriving scheduled passengers ¹ | Length of longest runway ² | |
|-----------------------------------|---|---------------------------------------|--------|
| | thousands | metres | feet |
| Toronto International | 9,706 | 3 368 | 11,050 |
| Montréal International | 7,026 | 3 353 | 11,000 |
| Vancouver International | 4,533 | 3 353 | 11,000 |
| Calgary International | 2,487 | 3 864 | 12,675 |
| Winnipeg International | 2,145 | 3 353 | 11,000 |
| Ottawa International | 1,726 | 3 048 | 10,000 |
| Edmonton International | 1,574 | 3 353 | 11,000 |
| Halifax International | 1,351 | 2 682 | 8,800 |
| Québec | 650 | 2 286 | 7,500 |
| Edmonton Municipal | 616 | 1 789 | 5,868 |
| Regina | 554 | 2 408 | 7,900 |
| Saskatoon | 488 | 2 530 | 8,300 |
| Victoria International | 462 | 2 134 | 7,000 |
| St. John's | 385 | 2 591 | 8,500 |
| Thunder Bay | 379 | 1 890 | 6,200 |
| Saint John | 288 | 2 134 | 7,000 |
| Prince George | 285 | 1 951 | 6,400 |
| Sept-Îles | 281 | 2 003 | 6,572 |
| Sydney | 280 | 2 155 | 7,070 |
| Moncton | 266 | 2 439 | 8,000 |
| Windsor | 255 | 2 408 | 7,900 |
| Gander | 230 | 3 201 | 10,500 |
| Fort St. John | 224 | 2 103 | 6,900 |
| London | 218 | 2 682 | 8,800 |
| Fredericton | 214 | 1 829 | 6,000 |

¹ The number of passengers is used as a correlate of total airport activity. More passengers arriving should mean more and larger aircraft using the facilities. The level of environmental stress is related to size of plane and the amount of aircraft activity at airports.

² The length of the longest runway acts as a rough indicator of the size of the largest plane that may land at an airport. The requirements per plane vary with its loads, the air temperature, elevation of airport, weather conditions and runway gradients. A Beechcraft D185, a small aircraft, requires approximately 1 035 metres for landing and 850 metres for takeoff under normal conditions. A Boeing 707-300, a large passenger plane, is likely to require 2 450 metres for landing and 3 000 metres for takeoff under similar conditions if it is carrying a full load.

Source: Catalogue 51-203, *Airport Activity Statistics* (1975); Surveys and Mapping Branch, Department of Energy, Mines and Resources, *VFR Chart Supplement*, 1975.

**TABLE 5.15. Licensed and Other Significant Canadian Airports and Airstrips,¹
With and Without Radio Control Towers by Province, 1975**

| | With radio control towers | Without radio control towers | Total |
|---------------------------------|------------------------------|---------------------------------|------------|
| Newfoundland | 4 | 9 | 13 |
| Prince Edward Island | 1 | 2 | 3 |
| Nova Scotia | 4 | 8 | 12 |
| New Brunswick | 4 | 10 | 14 |
| Quebec | 10 | 65 | 75 |
| Ontario | 18 | 91 | 109 |
| Manitoba | 5 | 27 | 32 |
| Saskatchewan | 3 | 35 | 38 |
| Alberta | 8 | 57 | 65 |
| British Columbia | 12 | 47 | 59 |
| Yukon | 1 | 8 | 9 |
| Northwest Territories | 2 | 38 | 40 |
| Canada | 72 | 397 | 469 |

¹ Includes all publicly (Ministry of Transport, Department of National Defence, city and provincial) and privately owned airports and airstrips, but does not include seaplane landing sites.

Source: Surveys and Mapping Branch, Department of Energy, Mines and Resources, *VFR Chart Supplement*, 1975.

TABLE 5.16. Port Activity as Measured by Net Registered Tonnage of Vessels,¹ 1975

| Port | Vessels arriving and departing, total net regis- tered tonnage ² | Total tonnage of cargo loaded and unloaded | Number of vessels arriving at port ³ | Ice conditions during winter ⁴ |
|----------------------------------|--|--|--|--|
| | thousands of tons | | | |
| Vancouver ⁵ | 44,794 | 35,521 | 9,736 | open |
| Montréal ⁶ | 32,082 | 18,632 | 3,373 | restricted |
| Sept-Îles ⁷ | 25,666 | 30,195 | 1,303 | restricted |
| Thunder Bay | 21,396 | 20,027 | 1,310 | closed |
| Halifax | 16,642 | 11,742 | 1,429 | open |
| Hamilton | 16,091 | 14,270 | 935 | closed |
| Port Cartier | 15,817 | 17,627 | 663 | restricted |
| Saint John | 13,935 | 10,850 | 988 | open |
| Québec | 12,758 | 12,496 | 1,016 | restricted |
| North Sydney | 11,502 | 623 | 1,728 | open |
| Sarnia | 10,124 | 9,090 | 1,552 | closed |
| Baie Comeau | 8,563 | 7,334 | 621 | open |
| Sault Ste. Marie | 7,744 | 5,930 | 506 | closed |
| Sorel | 6,977 | 7,428 | 530 | closed |
| Port Hawkesbury | 6,804 | 7,718 | 364 | open |
| Victoria | 5,752 | 1,976 | 2,058 | open |
| Toronto | 5,299 | 2,987 | 654 | closed |
| New Westminster | 5,237 | 2,481 | 2,013 | open |
| Trois-Rivières | 3,914 | 2,841 | 611 | restricted |
| Port Alfred | 3,882 | 4,004 | 353 | closed |

¹ Total net registered tonnage provides the capacity of the spaces within the hull and the enclosed spaces above the deck available for cargo and passengers, but excludes spaces used for the accommodation of officers and crew, and for storing navigation propelling machinery and fuel.

² Total net registered tonnage is counted for the arrival and the departure of each vessel.

³ Includes coastal traffic.

⁴ "Open" indicates that the port use is not restricted by ice; "restricted" indicates that use of the port is restricted by ice at some time during the winter and "closed" indicates that the port is closed by ice at some time during the winter.

⁵ Includes Roberts Bank.

⁶ Excludes Contrecoeur, Varennes and Verchères.

⁷ Includes Point Noire.

Source: Catalogue 54-203, *Shipping Report: Part II, International Seaborne Shippings* (1975), Catalogue 54-204, *Shipping Report: Part III, Coastwise Shipping* (1975); *The National Atlas of Canada*, Fourth Edition, Ottawa 1974.

TABLE 5.17. Number of Transport Vehicles Registered in Canada

| | Registered motor vehicles | Railroad motive power and rolling stock | Ships ¹ | Aircraft ² |
|------------|---------------------------|---|--------------------|-----------------------|
| 1910 | 5,945 | 128,112 | .. | .. |
| 1920 | 282,450 | 237,076 | .. | .. |
| 1930 | 1,232,489 | 227,824 | .. | 520 |
| 1940 | 1,500,829 | 171,272 | .. | 473 |
| 1950 | 2,600,269 | 186,590 | 14,816 | 2,242 |
| 1960 | 5,256,341 | 200,424 | 19,507 | 5,318 |
| 1970 | 8,497,339 | 194,955 | 27,072 | 11,315 |
| 1973 | 10,158,440 | 192,590 | 29,539 | 15,618 |
| 1975 | 11,442,643 | 199,110 | 30,563 | 17,990 |

¹ Includes fishing vessels.

² Includes aircraft with or without valid certification of airworthiness.

Source: Catalogue 52-209, *Railway Transport: Part III*; Catalogue 53-203, *The Motor Vehicle*; Catalogue 53-219, *The Motor Vehicle: Part III, Registrations*; Catalogue 51-202, *Civil Aviation*; unpublished information, Transportation Division, Statistics Canada.

TABLE 5.18. Inventory of Railroad Motive Power and Rolling Stock

| | Motive power | | | Rolling stock | |
|------------|--------------------|-----------------------------|----------------------|---|----------------------|
| | Steam locomotives | Diesel electric locomotives | Electric locomotives | Sleeping cars | Total passenger cars |
| 1910 | 4,079 | — | .. | 283 | 4,320 |
| 1920 | 6,014 | — | 16 | 584 | 6,557 |
| 1930 | 5,414 | — | 37 | 1,224 | 7,346 |
| 1940 | 4,272 ¹ | .. | 36 | 915 | 6,267 |
| 1950 | 4,272 | 350 | 33 | 795 | 6,338 |
| 1960 | 403 | 3,308 | 41 | 861 | 5,119 |
| 1965 | — | 3,301 | 22 | 641 | 3,638 |
| 1970 | — | 3,399 | 18 | 482 | 2,801 |
| 1973 | — | 3,748 | 14 | 393 | 2,175 |
| 1974 | — | 3,870 | 14 | 369 | 2,056 |
| 1975 | — | 3,963 | 14 | 344 | 1,936 |
| | Rolling stock | | | Passenger cars as a percentage of total rolling stock | |
| | Box cars | Flat cars | Total freight cars | | |
| | | | | | |
| 1910 | 75,983 | 20,769 | 119,713 | | 3.5 |
| 1920 | 155,964 | 24,939 | 224,489 | | 2.8 |
| 1930 | 151,500 | 17,728 | 215,027 | | 3.3 |
| 1940 | 116,629 | 12,049 | 160,697 | | 3.8 |
| 1950 | 122,419 | 11,263 | 175,597 | | 3.5 |
| 1960 | 111,217 | 12,645 | 191,553 | | 2.6 |
| 1965 | 105,822 | 13,475 | 182,090 ² | | 2.0 |
| 1970 | 101,746 | 18,043 | 188,737 | | 1.5 |
| 1973 | 95,239 | 22,010 | 186,653 | | 1.2 |
| 1974 | 95,538 | 24,898 | 190,892 | | 1.1 |
| 1975 | 92,669 | 25,722 | 193,197 | | 1.0 |

¹ Includes diesel electric locomotives.

² The power of locomotives and capacity of freight cars increased significantly in the period 1950-70. Thus a drop in the number of cars does not necessarily mean a decline in actual carrying capacity.

Source: Catalogue 52-209, *Railway Transport: Part III*.

TABLE 5.19. Number of Vessels Owned by Canadian Commercial, Chartering and Private Water Carriers, by Province of Domicile, 1974

| | Canadian flag | | | Non-Canadian flag – Active | Grand total |
|---------------------------------|---------------|----------|-------|----------------------------------|-------------|
| | Active | Inactive | Total | | |
| Newfoundland | 60 | 8 | 68 | – | 68 |
| Prince Edward Island | 6 | – | 6 | – | 6 |
| Nova Scotia | 66 | 15 | 81 | 11 | 92 |
| New Brunswick | 56 | 2 | 58 | 2 | 60 |
| Quebec | 270 | 12 | 282 | 40 | 322 |
| Ontario | 1,526 | 66 | 1,592 | 8 | 1,600 |
| Manitoba | 38 | 1 | 39 | – | 39 |
| Saskatchewan | 21 | – | 21 | – | 21 |
| Alberta | 48 | – | 48 | – | 48 |
| British Columbia | 1,345 | 92 | 1,437 | – | 1,437 |
| Northwest Territories | 5 | 1 | 6 | – | 6 |
| Yukon | 4 | – | 4 | – | 4 |
| Other | 8 | – | 8 | 6 | 14 |
| Canada | 3,453 | 197 | 3,650 | 67 | 3,717 |

Source: Transportation and Communications Divisions, Statistics Canada, *The Water Transportation Data Sheet, 1974, Advance Statistics*.

TABLE 5.20. Number of Registered Motor Vehicles

| | Passenger automobiles | Commercial vehicles | Motorcycles | Total |
|----------------|--------------------------|------------------------|-------------|------------|
| 1905 | 553 | .. | .. | 553 |
| 1910 | 5,890 | .. | 55 | 5,945 |
| 1920 | 251,945 | 22,310 | 8,195 | 282,450 |
| 1930 | 1,061,500 | 161,562 | 9,427 | 1,232,489 |
| 1940 | 1,236,492 | 250,958 | 13,379 | 1,500,829 |
| 1950 | 1,913,355 | 643,244 | 43,670 | 2,600,269 |
| 1960 | 4,104,415 | 1,117,450 | 34,476 | 5,256,341 |
| 1970 | 6,602,176 | 1,737,761 | 157,402 | 8,497,339 |
| 1973 | 7,866,084 | 2,004,536 | 287,820 | 10,158,440 |
| 1974 | 8,472,224 | 2,208,613 | 321,167 | 11,002,004 |
| 1975 | 8,870,307 | 2,211,462 | 360,874 | 11,442,643 |

Source: Catalogue 53-203, *The Motor Vehicle*; Catalogue 53-219, *The Motor Vehicle: Part III, Registrations*.

TABLE 5.21. Registered Civil Aircraft by Type of License

| | Type of license | | | | Total |
|--|-----------------|------------|-------------------------|--------------|--------|
| | Private | Commercial | Government ¹ | Experimental | |
| All aircraft: ² | | | | | |
| 1940 | 134 | 268 | 71 | .. | 473 |
| 1950 | 945 | 1,297 | .. | .. | 2,242 |
| 1960 | 3,247 | 1,863 | 204 | 4 | 5,318 |
| 1965 | 5,184 | 2,137 | 200 | 21 | 7,542 |
| 1970 | 7,816 | 3,261 | 201 | 37 | 11,315 |
| 1975 | 12,875 | 4,810 | 287 | 18 | 17,990 |
| Aircraft certified airworthy: ³ | | | | | |
| 1975 | 10,395 | 3,941 | 264 | 10 | 14,610 |

¹ Government aircraft includes aircraft owned by federal, provincial and local governments. It does not include military aircraft.

² These figures include planes that are registered but are either inactive or not airworthy.

³ The certificate is proof that in that year a licensed mechanic has inspected the aircraft and certified it mechanically sound and safe. Only aircraft with this certificate may actually fly.

Source: Catalogue 51-202, *Civil Aviation*; unpublished data, Aviation Statistics Centre, Statistics Canada.

TABLE 5.22. Aircraft by Weight

| | Weight class ¹ | | | | | Total |
|----------------|---------------------------|-----------------------|------------------------|-------------------------|--------------------------|--------|
| | Less than 4,000 pounds | 4,000 - 12,500 pounds | 12,501 - 30,000 pounds | 30,001 - 100,000 pounds | More than 100,000 pounds | |
| | number of aircraft | | | | | |
| 1960 | 4,280 | 685 | 160 | 161 | 32 | 5,318 |
| 1965 | 6,211 | 958 | 164 | 139 | 70 | 7,542 |
| 1970 | 9,443 | 1,350 | 205 | 178 | 139 | 11,315 |
| 1975 | 15,286 | 1,980 | 299 | 210 | 215 | 17,990 |

¹ The following are examples of aircraft for each weight class:

Less than 4,000 pounds Cessna 180, Piper Cherokee
 4,000 - 12,500 pounds Beech Baron, DeHavilland Beaver
 12,501 - 30,000 pounds DeHavilland Twin Otter, Lockheed Starfighter F104
 30,001 - 100,000 pounds Douglas Super DC-3, Douglas DC-9
 More than 100,000 pounds Boeing 747, Douglas DC-10.

Source: Transport Canada, Canadian Civil Aircraft Register; unpublished data, Aviation Statistics Centre, Statistics Canada.

TABLE 5.23. Movement of Goods by Mode of Transport, 1973

| Mode | Millions of ton miles |
|--|-----------------------|
| Railroad | 133,197 |
| Road (for hire trucking only) ¹ | 21,631 |
| Oil pipeline | 82,530 |
| Air | 520 |

¹ For hire trucking accounts for only 43,000 of the nearly two million registered trucks in Canada. Although the for hire trucks generally carry larger loads and haul over longer distances than the average truck, it is unlikely that the ton miles carried would be over 10% of the total.

Source: Catalogue 52-207, *Railway Transport: Part I* (1973); Catalogue 54-202, *Shipping Report: Part II, International Seaborne Shipping* (1973); Catalogue 54-204, *Shipping Reports: Part III, Coastwise Shipping* (1973); Catalogue 55-201, *Oil Pipeline Transport* (1973); Catalogue 51-002, *Air Carrier Operations in Canada* (1973); unpublished data, Transportation Division, Statistics Canada.

TABLE 5.24. Total Weight of Goods Carried by Mode of Transport, 1973

| Mode | Millions of tons |
|--|------------------|
| Railroad | 316.6 |
| Road (for hire trucking only) ¹ | 101.3 |
| Oil pipeline ² | 106.3 |
| Ship | 318.6 |
| Air | 0.5 |

¹ See footnote 1, Table 5.23.

² Tons of oil are obtained by using a conversion factor of 6.762 barrels equals one ton.

Source: Same as in Table 5.23.



Freight train, horses and rider, Alberta (N.F.B. Phototheque, photo by John de Visser)

TABLE 5.25. Railroad Freight Traffic

| | Tons carried | Ton miles | Freight train cars per freight train | Train hours ¹ |
|------------|--------------|-----------|---|--------------------------|
| | thousands | millions | | thousands |
| 1925 | 111,251 | 35,584 | 35.6 | .. |
| 1930 | 132,355 | 33,259 | 35.7 | .. |
| 1940 | 125,167 | 41,920 | 38.2 | .. |
| 1950 | 184,477 | 60,789 | 38.0 | .. |
| 1960 | 188,375 | 67,326 | 50.9 | 3,152 |
| 1970 | 283,150 | 112,872 | 69.8 | 2,948 |
| 1973 | 316,629 | 133,197 | 65.6 | 2,905 |
| 1974 | 326,232 | 141,403 | 63.6 | 3,164 |
| 1975 | 300,109 | 138,577 | 67.6 | 2,882 |

¹ Train hours are defined as the hours trains are in actual service.

Source: Catalogue 52-210, *Steam Railroad Statistics*; Catalogue 52-207, *Railway Transport: Part I*.

TABLE 5.26. Cargo Movements Through Canadian Ports

| | Cargo loaded and unloaded | | | Vessel arrivals and departures | | |
|-------------------------|--|-----------------------------------|---------|--|-----------------------------------|---------|
| | International shipping ¹ | Domestic shipping ² | Total | International shipping ¹ | Domestic shipping ² | Total |
| | thousands of short tons | | | number | | |
| 1935 | 18,522 | .. | .. | 70,132 | 136,986 | 207,118 |
| 1940 | 27,773 | .. | .. | 93,653 | 156,278 | 249,931 |
| 1950 ³ | 57,471 | .. | .. | 64,923 | 166,289 | 231,212 |
| 1960 | 89,518 | 81,367 | 170,885 | 68,419 | 233,861 | 302,280 |
| 1965 | 135,914 | 106,327 | 242,241 | 57,912 | 195,211 | 253,123 |
| 1970 | 164,210 | 124,817 | 289,027 | 50,604 | 156,379 | 206,983 |
| 1971 | 164,090 | 122,515 | 286,605 | 49,450 | 135,423 | 184,873 |
| 1972 | 175,672 | 122,404 | 298,076 | 49,016 | 125,617 | 174,633 |
| 1973 | 196,646 | 121,947 | 318,593 | 47,091 | 116,510 | 163,601 |
| 1974 | 183,897 | 118,241 | 302,138 | 42,272 | 106,529 | 148,801 |
| 1975 | 183,227 | 119,871 | 303,098 | 40,522 | 93,742 | 134,264 |

¹ International shipping includes trips that have one terminal point in Canada and the other in a foreign port.

² Domestic shipping includes trips that originate and terminate in Canadian ports.

³ Data for Newfoundland were included from April 1, 1949. Data for non-customs ports were included for the first time in 1957.

Source: Same as in Table 5.16.

TABLE 5.27. Oil Movement by Pipeline

| | Barrel miles (trunk lines only) | Net received flows of crude oil ¹ into pipelines |
|------------|------------------------------------|--|
| | billions | millions of barrels |
| 1951 | 23.62 | 47.5 |
| 1955 | 83.86 | 112.8 |
| 1960 | 119.11 | 185.1 |
| 1965 | 203.99 | 315.4 |
| 1970 | 367.77 | 501.3 |
| 1973 | 558.09 | 718.8 |
| 1974 | 535.13 | 691.4 |
| 1975 | 448.88 | 590.0 |

¹ The net receipts are the unduplicated receipts of crude oil of all pipeline companies in Canada.

Source: Catalogue 55-201, *Oil Pipeline Transport*; Catalogue 55-001, *Oil Pipeline Transport*.

TABLE 5.28. Air Freight Movement

| | Goods carried | Goods ton miles |
|----------------|-------------------|-----------------|
| | thousands of tons | millions |
| 1951 | 35.38 | 13.87 |
| 1955 | 130.09 | 27.13 |
| 1960 | 130.89 | 53.37 |
| 1965 | 185.21 | 133.42 |
| 1970 | 379.26 | 380.20 |
| 1973 | 524.48 | 520.28 |
| 1974 | 535.70 | 550.79 |
| 1975 | 553.14 | 564.80 |

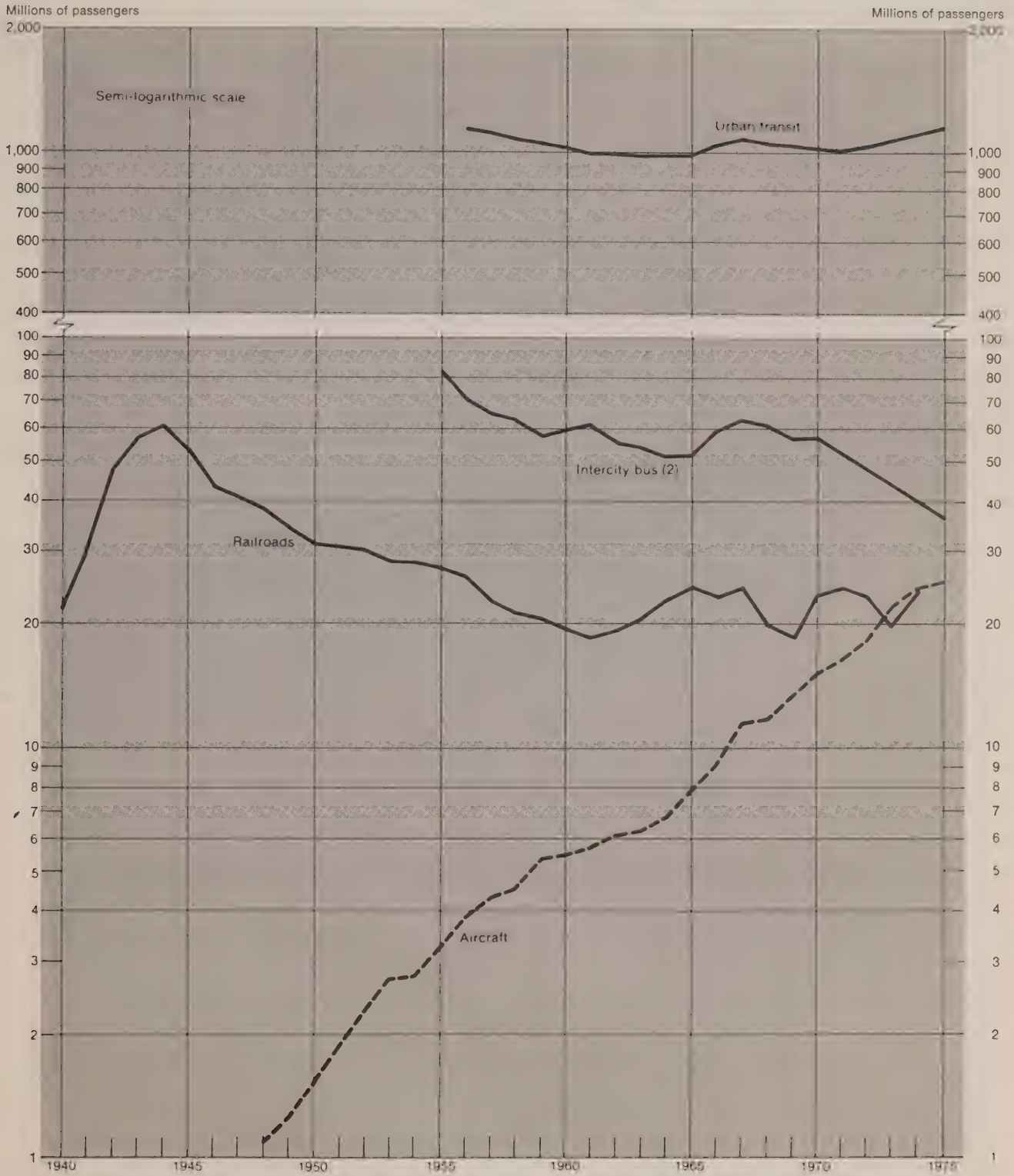
Source: Catalogue 51-002, *Air Carrier Operations in Canada*; Catalogue 51-501, *Aviation in Canada* (1971).



Resolute Bay, N.W.T. (N.F.B. Phototheque, photo by Crombie McNeill)

Chart — 5.29

Passengers Carried by Transportation Mode



(1) In the cases of Urban Transit and Intercity Bus, trends are shown from the earliest year that comparable data were available.

(2) Includes only class one operations. These are defined as those earning more than \$100,000 in gross revenues/year.

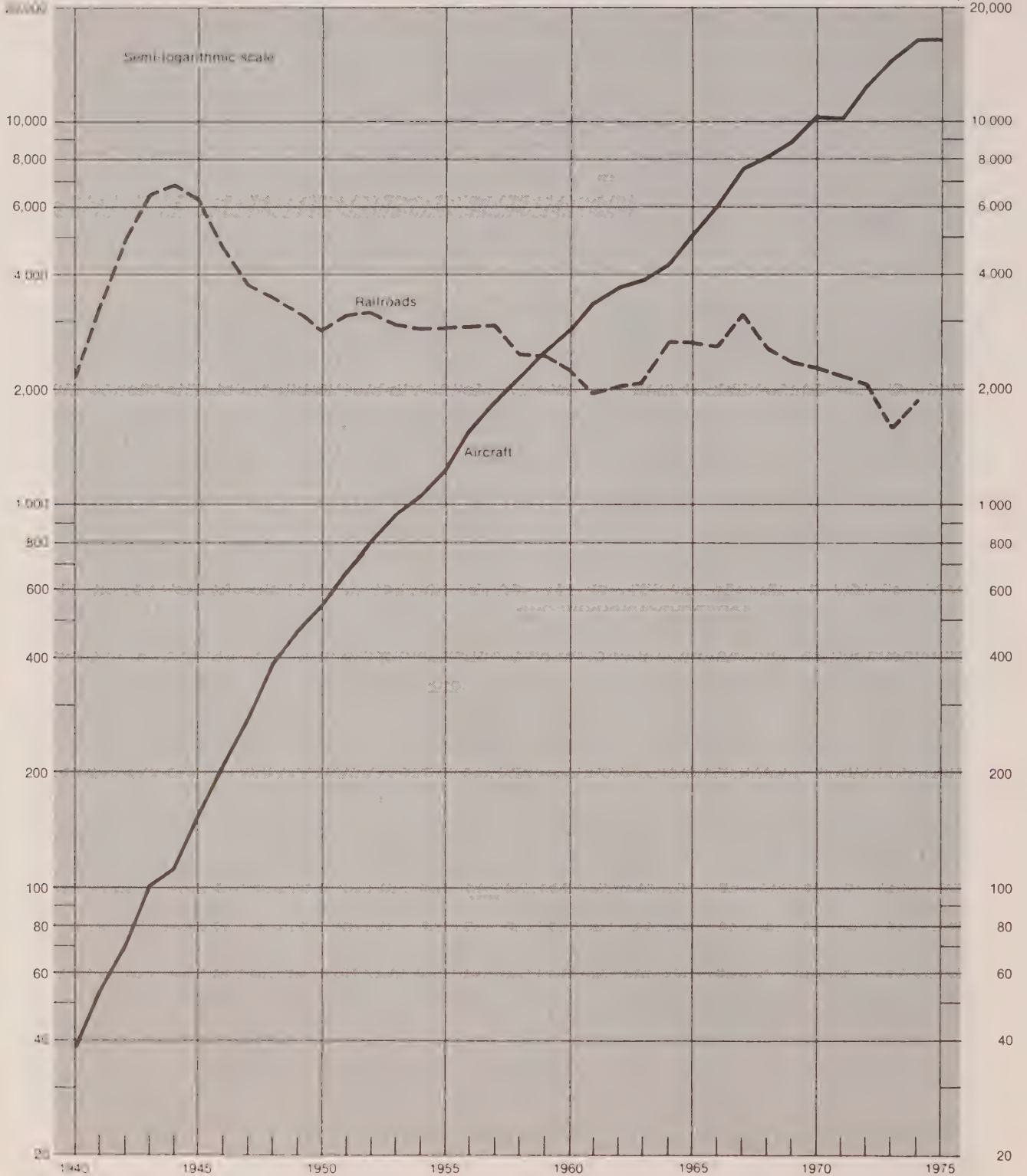
Sources: See Tables 5.8, 5.14, 5.31, 5.34, 5.35 and 5.36.

Chart — 5.30

Railroads and Aircraft Passenger Miles

Number of passenger miles
(000,000')

Number of passenger miles
(000,000')



Source: Same as in chart 5.29.

TABLE 5.31. Railroad Passenger Movement

| | Passengers carried | Passenger miles | Average number of passengers per car in service | Passenger cars per passenger train |
|-----------------------------|-----------------------|--------------------|---|---------------------------------------|
| | millions | | | |
| 1925 | 45.5 | 2,911 | 13 | 4.5 |
| 1930 | 34.7 | 2,423 | 11 | 4.5 |
| 1940 | 22.0 | 2,176 | 13 | 4.7 |
| 1944 ¹ | 60.3 | 6,873 | 24 | 6.2 |
| 1950 | 31.1 | 2,816 | 14 | 4.9 |
| 1960 | 19.5 | 2,264 | 13 | 5.8 |
| 1965 | 24.6 | 2,666 | 16 | 6.5 |
| 1970 | 23.9 | 2,272 | 16 | 6.4 |
| 1973 | 19.8 | 1,599 | 16 | 4.8 |
| 1974 | 24.1 | 1,878 | 15 | 4.8 |
| 1975 | 23.6 | 1,821 | 15 | 5.3 |

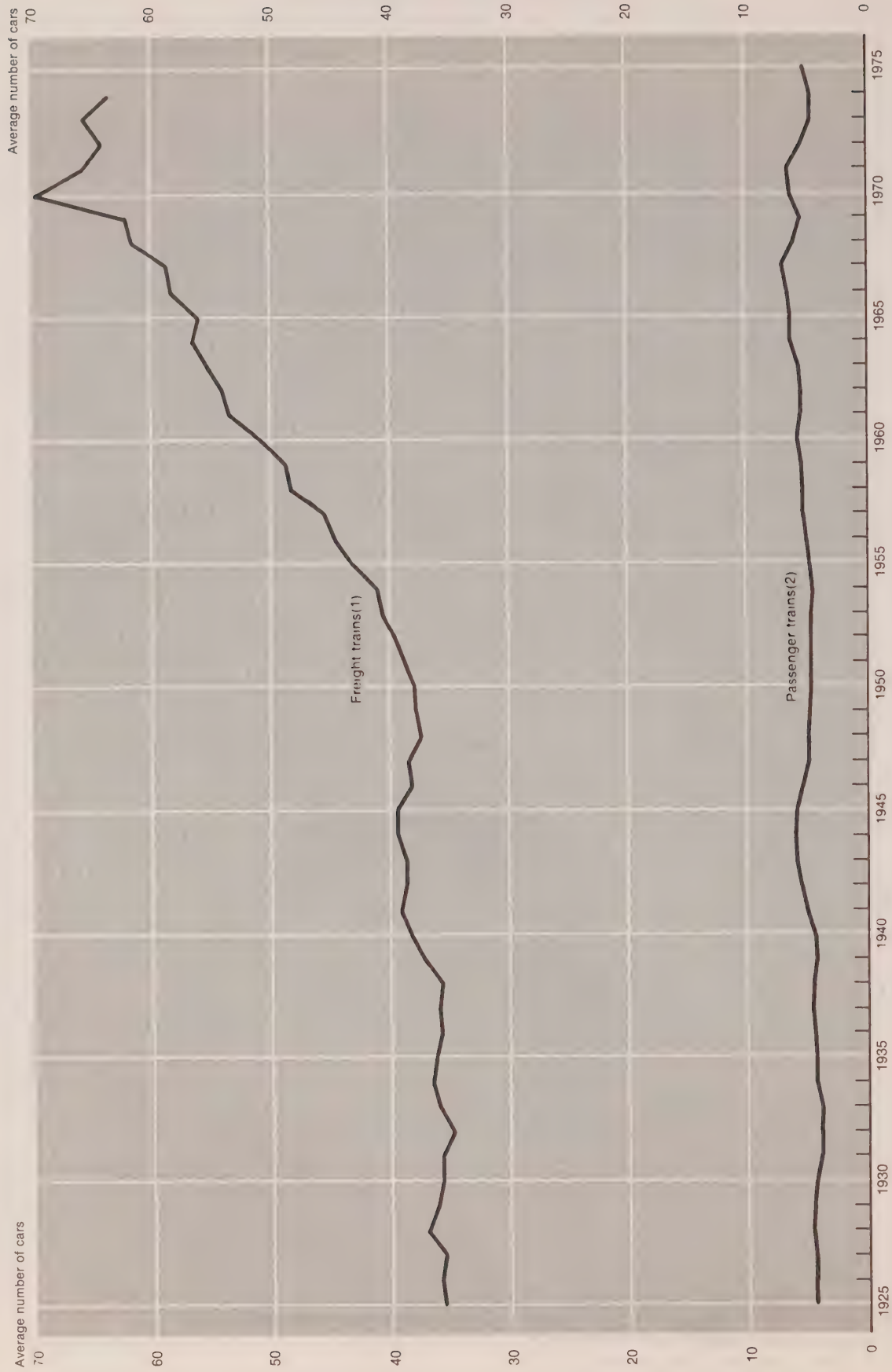
¹ The year 1944 was the peak of rail service. This figure is presented to show the capacities railways have been able to operate at in the past when intermodal competition was limited.

Source: Catalogue 57-212, *Steam Railway Statistics*; Catalogue 57-207, *Railway Transport*.



Casselman, Ontario, (photo par Bruce Mitchell)

Chart — 5.32
Average Number of Cars per Train



(1) Includes all freight cars whether full or empty.

(2) Includes only passenger carrying cars.

Source: Same as in Table 5.31.

TABLE 5.33. The Journey to Work, Modal Split

| Method | November 1973 | June 1974 | November 1974 |
|---|---------------|--------------|---------------|
| | per cent | | |
| Driver of car (with passenger) | 9.0 | 8.8 | 9.4 |
| Driver of car (without passenger) | 50.4 | 50.0 | 50.7 |
| Passenger in private car | 13.1 | 13.1 | 13.3 |
| Passenger in taxi | 0.6 | 0.5 | 0.5 |
| Motorcycle, bicycle | 0.4 | 2.0 | 0.5 |
| Walks to work | 8.6 | 9.1 | 8.9 |
| Bus, street car, subway | 16.0 | 15.1 | 15.3 |
| Commuter train | 0.4 | 0.4 | 0.5 |
| Other and don't know | 1.5 | 1.0 | 0.9 |
| Total | 100.0 | 100.0 | 100.0 |

Source: Catalogue 71-001, *The Labour Force* (November 1973, June 1974 and November 1974).

TABLE 5.34. Urban Transit

| | Number of fare passengers | | Revenue vehicle miles | |
|----------------|---------------------------|-----------------------------|-----------------------|-----------------------------|
| | Urban routes | All activities ¹ | Urban routes | All activities ¹ |
| | millions | | | |
| 1956 | .. | 1,151.9 | .. | 203.9 |
| 1960 | .. | 1,029.3 | .. | 200.1 |
| 1965 | 974.6 | 985.2 | 210.0 | 213.8 |
| 1970 | 1,006.8 | 1,018.4 | 247.6 | 251.7 |
| 1975 | 1,133.2 | 1,143.2 | 316.7 | 324.2 |

¹ Includes urban services, charter operations and some rural services.

Source: Catalogue 53-216, *Urban Transit*; Catalogue 53-003, *Urban Transit*.

TABLE 5.35. Intercity and Rural Passenger Bus Transit ¹

| | Number of fare passengers | | Vehicle miles | |
|----------------|---------------------------------|---------------------------|---------------------------------|---------------------------|
| | Intercity and rural routes only | All services ² | Intercity and rural routes only | All services ² |
| | thousands | | | |
| 1955 | 64,814 | 82,237 | 83,202 | 90,640 |
| 1960 | 49,117 | 59,848 | 80,415 | 89,020 |
| 1965 | 41,704 | 51,797 | 83,627 | 96,689 |
| 1970 | 44,617 | 57,369 | 105,005 | 126,356 |
| 1975 | 33,242 | 36,743 | 116,368 | 129,477 |

¹ See footnote 2, Chart 5.29.

² Includes intercity and rural operations, some urban operations and charter services.

Source: Catalogue 53-207, *Motor Carriers – Freight and Passenger*; Catalogue 53-215, *Passenger Bus Statistics*; Catalogue 53-002, *Passenger Bus Statistics – Intercity and Rural*; Catalogue 11-001, *Statistics Canada Daily* (February 5, 1976).

TABLE 5.36. Air Transportation Passenger Movements¹

| | Miles flown | Passengers | Passenger miles ² | Passenger load factor ³ |
|----------------|-------------|-----------------------|------------------------------|------------------------------------|
| | millions | thousands | millions | per cent |
| 1940 | 11.012 | 149.03 ² | 38.4 | .. |
| 1950 | 41.368 | 1,511.02 ² | 550.5 | 65.5 |
| 1960 | 109.699 | 5,451.72 ² | 2,847.0 | 63.3 |
| 1965 | 124.448 | 7,838.54 ⁴ | 5,065.5 | 62.0 |
| 1970 | 229.410 | 15,040.41 | 10,280.0 | 55.8 |
| 1973 | 267.786 | 22,094.31 | 14,605.6 | 64.8 |
| 1974 | 288.574 | 24,621.11 | 16,719.2 | 62.2 |
| 1975 | 300.255 | 25,626.25 | 16,672.8 | 57.8 |

¹ Includes all foreign and domestic services by Canada carriers and that part of service by foreign carriers taking place over Canadian territory.

² Includes only unit toll operations. Unit toll is defined as the public transportation of persons and/or goods between designated points or from a designated base to a defined area at a fixed rate per unit.

³ The "passenger load factor" refers to the percentage of an aircraft's seating capacity occupied by unit toll operations of the two transcontinental and five regional air carriers. The figure is arrived at by taking passenger miles as a percentage of available seat miles.

⁴ Includes unit toll operations only for foreign carriers.

Source: Catalogue 51-501, *Aviation in Canada (1971)*; Catalogue 51-002, *Air Carrier Operations*; Catalogue 51-001, *Civil Aviation*; Catalogue 51-202, *Civil Aviation*.

TABLE 5.37. Population Affected by Airport Noise¹ in Selected Metropolitan Areas

| | International airports | | | | | |
|---|------------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|
| | Montréal | | Ottawa | | | |
| | Number of persons | Per cent ² | Number of persons | Per cent ² | | |
| Population in noise zone: | | | | | | |
| Lower ³ | 252,280 | 9.2 | 32,955 | 5.5 | | |
| Intermediate ⁴ | 130,035 | 4.7 | 4,515 | 0.7 | | |
| Upper ⁵ | 59,270 | 2.2 | 1,600 | 0.3 | | |
| Total | 441,585 | 16.1 | 39,070 | 6.5 | | |
| Total population in metropolitan area, 1971 | 2,743,230 | 100.0 | 602,560 | 100.0 | | |
| | Toronto | | Edmonton | | Vancouver | |
| | Number of persons | Per cent ² | Number of persons | Per cent ² | Number of persons | Per cent ² |
| | | | | | | |
| Population in noise zone: | | | | | | |
| Lower ³ | 51,019 | 1.9 | 27,925 | 5.6 | 12,385 | 1.1 |
| Intermediate ⁴ | 45,958 | 1.8 | 10,810 | 2.2 | 6,145 | 0.6 |
| Upper ⁵ | 24,093 | 0.9 | 3,165 | 0.6 | 3,835 | 0.4 |
| Total | 121,070 | 4.6 | 41,900 | 8.4 | 22,365 | 2.1 |
| Total population in metropolitan area, 1971 | 2,628,125 | 100.0 | 495,915 | 100.0 | 1,082,350 | 100.0 |

¹ Based on noise contours prepared for Central Mortgage and Housing Corporation by the Canadian Air Transportation Administration, Ministry of Transport. Values are derived by measuring the noise generated by each type of aircraft (both arriving and departing) in effective perceived noise decibels, which take into account the subjectively annoying effects of the noise including pure tones and duration. These values are aggregated into a single number evaluation which is known as the Noise Exposure Forecast (NEF). It should be noted that NEF values increase logarithmically; hence, an increase of 10 NEF units has the effect of making the noise seem twice as loud.

² The percentage figures are the populations of the specified zones as a proportion of the total metropolitan population.

³ In the "lower" noise zone values range between 25 and 30 estimated potential noise decibels (EPNDB). For the Toronto International Airport values range between 28 and 30.

⁴ In the "intermediate" noise zone, values fall between 30 and 35 EPNDB's.

⁵ In the "upper" noise zone NEF values are greater than 35 EPNDB's.

Source: Catalogues 95-704, 95-715, 95-721, 95-727 and 95-728, *1971 Census of Canada*; Central Mortgage and Housing Corporation, *New Housing and Airport Noise*, Ottawa; Noise exposure contour maps for selected cities, Central Mortgage and Housing Corporation; Noise contours for Toronto from Toronto Area Airports Project, Ministry of Transport, Toronto.

Noise Exposure Forecast for Toronto International Airport (Malton), 1974

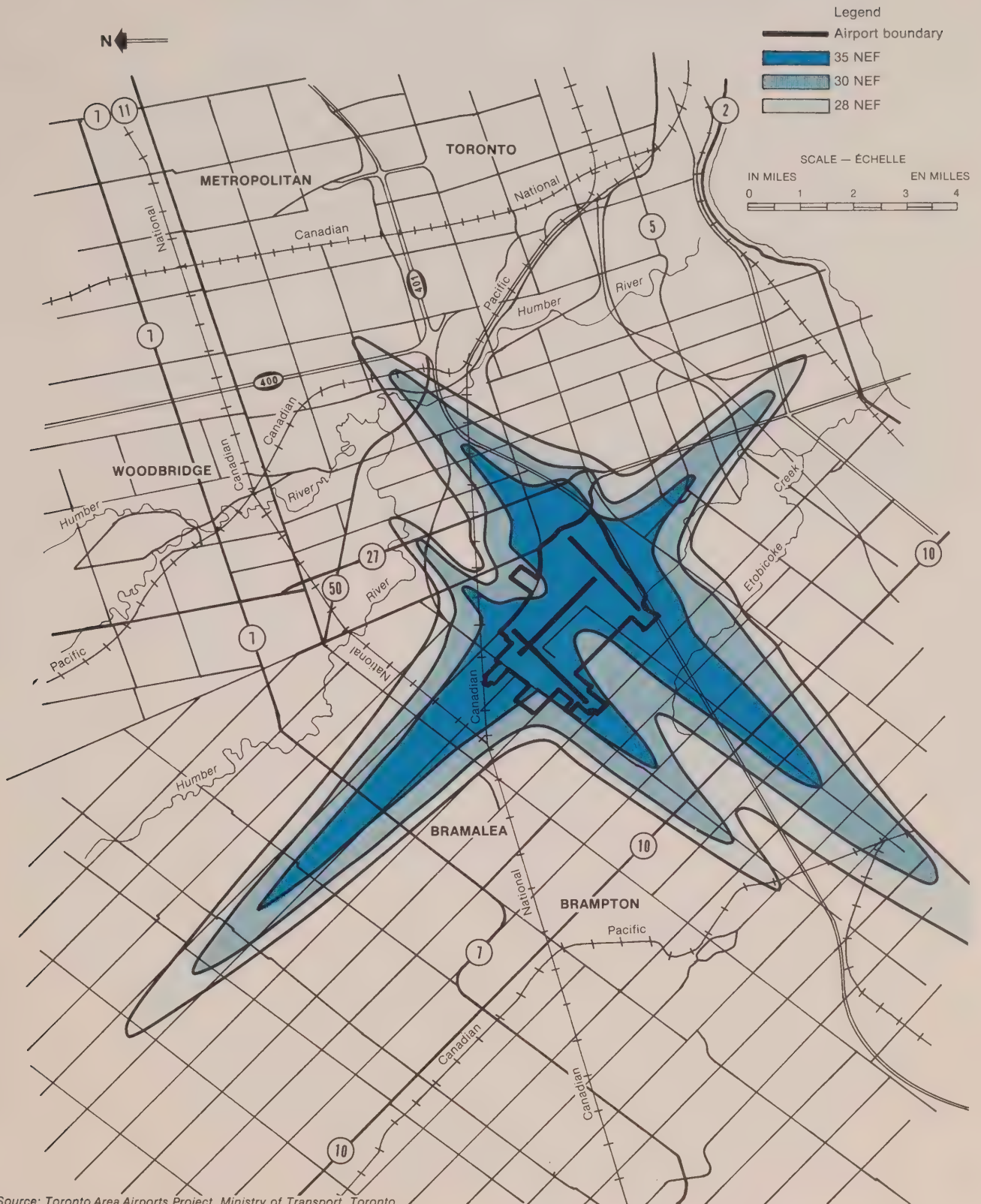


TABLE 5.39. Annual Amounts of Energy Consumed¹ by Transportation Mode

| | Road | Rail | Air | Marine | Total |
|----------------|---------------------------|--------------------|-------|--------|---------|
| | 10 ¹² B.t.u.'s | | | | |
| 1958 | 496.3 | 127.1 ² | 40.2 | 72.0 | 735.6 |
| 1960 | 541.2 | 78.1 | 44.8 | 81.5 | 745.6 |
| 1965 | 694.7 | 85.9 | 55.4 | 102.4 | 938.4 |
| 1970 | 920.5 | 85.0 | 97.4 | 105.7 | 1,208.6 |
| 1973 | 1,120.1 | 95.5 | 119.9 | 125.4 | 1,460.9 |

¹ These data reflect the use of energy by the various modes and should not be viewed as a measure of efficiency.

² Steam locomotives comprised a sizeable proportion of total railroad motive power. Their energy consumption per unit was significantly greater than that for a diesel electric locomotive.

Source: Catalogue 57-207, *Detailed Energy Supply and Demand in Canada* (1970 and 1973); Catalogue 57-505, *Detailed Energy Supply and Demand in Canada, 1958 - 1969*.

CHAPTER VI

MANUFACTURING

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MANUFACTURING

This chapter focuses on that activity of the economy organized to transform materials (originally extracted from the environment) into most of the tangible commodities of our society. The environmental perspective of the chapter is obtained by reorganizing Statistics Canada's manufacturing data to highlight certain aspects of environmental stress. It is clearly a very partial and selective view of the problem and is not intended, except in a highly indirect manner, to contribute to the information base on the impact of industrial activity on the environment.

Three approaches were employed in organizing the data. Tables 6.1 to 6.5 classify manufacturing activity into three process types which are distinguished by the degree of stress they impose on the environment. (See below for a description of these classes.) This information is presented by province, metropolitan area and watershed.

Tables 6.8 to 6.11 are derived from the applications for Accelerated Capital Cost Allowance approved by Environment Canada in late 1975. These data show the accumulated (1969 - 75) expenditure on pollution abatement equipment by broad categories of industry. The data highlight the different levels of expenditure by object of expenditure, i.e., water, air, type of pollutant and type of equipment, as well as by province. Time series have been omitted because of the lack of knowledge of the extent of coverage, specifically, what proportion of industries that incurred expenditure on pollution abatement equipment applied for Accelerated Capital Cost Allowances. This is the first time that tables in this form have been published in Canada.

Finally, a rather eclectic selection of historical data covering various aspects of "high environment impact" materials and consumer goods are displayed in Tables 6.12 to 6.21.

An Explanation of the Stressor Groups

High Stressor

This group is associated with the initial stages of manufacturing, characterized by large-scale bulk refinement and concentration processes of raw materials drawn from the environment. These industries typically require high-energy input per unit of output and are generally identified as the "high polluters", although this

may in part be due to the scale of the activity rather than the nature of the process employed. The statistics provide a striking picture of the average scale of activity; although these industries accounted for less than 3% of the establishments and employed 12% of the production workers, they accounted for 61% of the fossil fuels consumed, 60% of the electricity used and 76% of the water intake of all manufacturing in 1973.

Medium Stressor

Industries in this group are largely associated with the second level of processing where materials undergo a transformation for specialized purposes required for the next and final stage, although some finished-goods manufacturing activity is included because of special polluting problems.¹ The use of complex technologies associated with specific products is characteristic of this group. The "medium stressor" manufacturing activity accounted for about 20% of the establishments, 20% of the production workers and 15% of the fossil fuel inputs in 1973.

Low Stressor

This group contains the remaining industries and in this sense can be considered as a residual category. Nevertheless, it accounts for a large part of the industries which produce final goods. These goods are distinguished by their design and functional purpose rather than basic physical-chemical transformation. In terms of process activity, they tend to fall under the headings of assembly, construction, or packaging. They are characterized by high labour input per unit of output with relatively low energy and material inputs. Although this group accounted for 78% of the establishments and 68% of the production workers, their fossil fuel input was only 23% of the total of all manufacturing in 1973.

The figures displayed in the "stressor type" tables are intended as indicators of the order of magnitude of potential stress by manufacturing activity on a geographical basis, i.e., by watershed, metropolitan area and province, and these figures should be used with caution for other analytical purposes.

¹ These industries include mainly food processing and certain light chemical manufacturing, such as pharmaceuticals, medicines and soaps. These were identified from the list of "priority industries" for the purpose of preparing pollution abatement guidelines by the Environmental Protection Service of the Department of Fisheries and the Environment.

**Industries by Stressor Type — Industries Defined
by the Standard Industrial Classification (S.I.C.)**

| S.I.C. | S.I.C. |
|---|---|
| High stressor: | Medium stressor — Concluded: |
| Pulp and paper mills 271 | Manufacturers of pharmaceuticals and medicines 374 |
| Iron and steel mills 291 | Paint and varnish 375 |
| Smelting and refining. 295 | Soap and cleaning compounds. 376 |
| Cement manufacturers. 352 | Miscellaneous chemicals 379 |
| Ready-mix concrete manufacturers . . . 355 | |
| Lime manufacturers 358 | |
| Petroleum refining 3651 | |
| Industrial chemicals. 378 | |
| Medium stressor: | Low stressor: |
| Meat and poultry products 101 | Bakery products 107 |
| Fish products. 102 | Miscellaneous food industries 108 |
| Fruit and vegetable processing. 103 | Tobacco products 151 and 153 |
| Dairy 104 | Rubber footwear 1624 |
| Flour and breakfast cereal products . . 105 | Miscellaneous rubber products. 1629 |
| Feed industry. 106 | Plastic fabricating, n.e.s. 165 |
| Beverage industry 109 | Shoe factories 174 |
| Tire and tube manufacturers 1623 | Leather glove factories. 175 |
| Leather tanneries 172 | Luggage, handbag and small leather goods. 179 |
| Textile industries 181 - 189 | Knitting mills. 231 and 239 |
| Asphalt roofing manufacturers 272 | Clothing industries 243 - 249 |
| Steel pipe and tube mills 292 | Wood industries 251 - 259 |
| Iron foundries 294 | Furniture and fixtures 261 - 268 |
| Aluminum rolling, casting and ex- truding. 296 | Paper box and bag manufacturers. 273 |
| Copper and copper alloy rolling, casting and extruding 297 | Miscellaneous paper converters 274 |
| Metal rolling, casting and extruding, n.e.s. 298 | Printing, publishing and allied 286 - 289 |
| Metal stamping, pressing and coating . . 304 | Metal fabricating. 301 - 309 except 304 |
| Clay products manufacturers. 351 | Machinery 311 - 318 |
| Manufacturers of lubricating oils and greases 3652 | Transportation equipment 321 - 329 |
| Miscellaneous petroleum and coal pro- ducts 369 | Electrical products 331 - 339 |
| Manufacturers of mixed fertilizers . . . 372 | Stone products. 353 |
| Manufacturers of synthetic plastics and resins 373 | Concrete products. 354 |
| | Glass and glass products 356 |
| | Abrasive manufacturers 357 |
| | Miscellaneous non-metallic mineral pro- ducts 359 |
| | Manufacturers of toilet preparations. . . 377 |
| | Miscellaneous manufacturing 391 - 399 |

TABLE 6.1. Industrial Activity by Stressor Type¹

| Stressor type and year | Establishments | | Workers | | Manufacturing value added | |
|---------------------------------|---------------------------|----------|---------------------------|----------|-----------------------------|----------|
| | number | per cent | thousands | per cent | millions of current dollars | per cent |
| High: | | | | | | |
| 1961 | 557 | 1.7 | 129.9 | 13.8 | 2,194.5 | 21.0 |
| 1971 | 783 | 2.4 | 153.2 | 13.1 | 3,801.2 | 17.5 |
| 1973 | 788 | 2.5 | 155.4 | 12.2 | 5,084.0 | 17.7 |
| Medium: | | | | | | |
| 1961 | 2 | 2 | 2 | 2 | 2 | 2 |
| 1971 | 6,466 | 20.3 | 234.9 | 20.1 | 5,015.0 | 23.1 |
| 1973 | 6,073 | 19.5 | 253.7 | 19.9 | 6,408.5 | 22.2 |
| Low: | | | | | | |
| 1961 | 32,800 | 98.3 | 809.5 | 86.2 | 8,240.3 | 79.0 |
| 1971 | 24,659 | 77.3 | 779.7 | 66.8 | 12,921.4 | 59.4 |
| 1973 | 24,284 | 78.0 | 866.9 | 67.9 | 17,332.5 | 60.1 |
| Total manufacturing industries: | | | | | | |
| 1961 | 33,357 | 100.0 | 939.4 | 100.0 | 10,434.8 | 100.0 |
| 1971 | 31,908 | 100.0 | 1,167.8 | 100.0 | 21,737.6 | 100.0 |
| 1973 | 31,145 | 100.0 | 1,276.0 | 100.0 | 28,825.0 | 100.0 |
| Purchased fuel | | | | | | |
| Fossil | | | Electricity ³ | | Water intake ⁴ | |
| | 10 ¹² B.t.u.'s | per cent | 10 ¹² B.t.u.'s | per cent | millions of gallons per day | per cent |
| High: | | | | | | |
| 1961 | 186.3 | 49.5 | 51.2 | 38.0 | .. | .. |
| 1971 | 536.5 | 64.8 | 159.0 | 71.2 | .. | .. |
| 1973 | 576.3 | 61.2 | 171.3 | 69.1 | 4,339 | 76.2 |
| Medium: | | | | | | |
| 1961 | 2 | 2 | 2 | 2 | .. | .. |
| 1971 | 2 | 2 | 2 | 2 | .. | .. |
| 1973 | 143.7 | 15.3 | 2 | 2 | 528 | 9.3 |
| Low: | | | | | | |
| 1961 | 189.8 | 50.5 | 83.4 | 62.0 | .. | .. |
| 1971 | 291.9 | 35.2 | 64.3 | 28.8 | .. | .. |
| 1973 | 221.7 | 23.5 | 76.7 | 30.9 | 824 | 14.5 |
| Total manufacturing industries: | | | | | | |
| 1961 | 376.1 | 100.0 | 134.6 | 100.0 | .. | .. |
| 1971 | 828.4 | 100.0 | 223.3 | 100.0 | .. | .. |
| 1973 | 941.7 | 100.0 | 248.0 | 100.0 | 5,691 | 100.0 |

¹ For the definition of which manufacturing industries are included in the "high, medium and low" categories, see text.

² Due to technical difficulties it was not possible to separate out the medium and low groups, therefore, they have been combined and listed under low for that year.

³ In 1973 the following amounts were generated for the companies' own use: High stressor-hydro (66.2 x 10¹² B.t.u.'s), thermal (15 x 10¹² B.t.u.'s); other manufacturing and mining-hydro (1.6 x 10¹² B.t.u.'s); thermal (4.4 x 10¹² B.t.u.'s).

⁴ Estimates apply to 1972 and are based on a survey of 4,437 plants accounting for approximately 95% of the total water withdrawals by all manufacturing establishments in that year.

Source: Special tabulations from the Manufacturing and Primary Industries Division, Statistics Canada; Catalogue 31-201, *General Review of the Manufacturing Industries* (1961); Catalogue 57-002, *Energy Statistics*, Service Bulletin (June 1974 and February 1976); Tabulations from the Industrial Water Use Survey, Water Planning and Management Branch, Fisheries and Environment Canada.

TABLE 6.2. Industrial Activity by Stressor Type,¹ by Province, 1973

| Province and stressor type | Establishments | | Workers | | Purchased fossil fuel | | Water intake ² |
|----------------------------|----------------|----------|-----------|----------|---------------------------|----------|-----------------------------|
| | number | per cent | thousands | per cent | 10 ¹² B.t.u.'s | per cent | millions of gallons per day |
| Newfoundland: | | | | | | | |
| High | 12 | 4.9 | 3.3 | 28.4 | 11.8 | 84.3 | .. |
| Medium | 84 | 34.3 | 6.0 | 52.7 | 1.6 | 11.4 | .. |
| Low | 149 | 60.8 | 2.2 | 18.9 | 0.6 | 4.3 | .. |
| Total | 245 | 100.0 | 11.5 | 100.0 | 14.0 | 100.0 | 247.1 |
| Prince Edward Island: | | | | | | | |
| High | — | — | — | — | — | — | .. |
| Medium | 72 | 55.0 | 1.5 | 76.7 | 0.4 | 93.0 | .. |
| Low | 59 | 45.0 | 0.4 | 23.3 | 0.03 | 7.0 | .. |
| Total | 131 | 100.0 | 1.9 | 100.0 | 0.43 | 100.0 | 6.8 |
| Nova Scotia: | | | | | | | |
| High | 29 | 3.9 | 5.9 | 21.3 | 17.9 | 76.2 | .. |
| Medium | 195 | 26.1 | 8.6 | 31.3 | 3.0 | 12.8 | .. |
| Low | 522 | 70.0 | 13.1 | 47.4 | 2.6 | 11.0 | .. |
| Total | 746 | 100.0 | 27.6 | 100.0 | 23.5 | 100.0 | 211.6 |
| New Brunswick: | | | | | | | |
| High | 27 | 4.6 | 5.2 | 22.1 | 30.8 | 81.9 | .. |
| Medium | 160 | 27.4 | 6.1 | 26.1 | 2.4 | 6.4 | .. |
| Low | 398 | 68.0 | 12.1 | 51.8 | 4.4 | 11.7 | .. |
| Total | 585 | 100.0 | 23.4 | 100.0 | 37.6 | 100.0 | 230.7 |
| Quebec: | | | | | | | |
| High | 188 | 1.9 | 42.8 | 10.9 | 133.1 | 61.6 | .. |
| Medium | 1,770 | 17.8 | 75.9 | 19.4 | 45.3 | 21.0 | .. |
| Low | 7,989 | 80.3 | 272.8 | 69.7 | 37.6 | 17.4 | .. |
| Total | 9,947 | 100.0 | 391.5 | 100.0 | 216.0 | 100.0 | 1,132.7 |
| Ontario: | | | | | | | |
| High | 256 | 2.1 | 69.0 | 11.2 | 235.5 | 53.1 | .. |
| Medium | 2,493 | 20.1 | 117.9 | 19.1 | 64.3 | 14.5 | .. |
| Low | 9,648 | 77.8 | 430.0 | 69.7 | 144.1 | 32.4 | .. |
| Total | 12,397 | 100.0 | 616.9 | 100.0 | 443.9 | 100.0 | 2,646.3 |
| Manitoba: | | | | | | | |
| High | 29 | 2.2 | 3.4 | 8.7 | 10.5 | 53.8 | .. |
| Medium | 276 | 21.3 | 7.9 | 20.0 | 4.3 | 22.1 | .. |
| Low | 990 | 76.5 | 28.1 | 71.3 | 4.7 | 24.1 | .. |
| Total | 1,295 | 100.0 | 39.4 | 100.0 | 19.5 | 100.0 | 82.2 |
| Saskatchewan: | | | | | | | |
| High | 37 | 5.5 | 1.2 | 9.6 | 8.6 | 61.9 | .. |
| Medium | 147 | 21.8 | 4.9 | 40.2 | 3.1 | 22.3 | .. |
| Low | 491 | 72.7 | 6.1 | 50.2 | 2.2 | 15.8 | .. |
| Total | 675 | 100.0 | 12.2 | 100.0 | 13.9 | 100.0 | 33.5 |
| Alberta: | | | | | | | |
| High | 80 | 4.4 | 4.6 | 11.5 | 52.6 | 70.5 | .. |
| Medium | 400 | 22.0 | 10.9 | 27.1 | 13.6 | 18.2 | .. |
| Low | 1,336 | 73.6 | 24.6 | 61.4 | 8.4 | 11.3 | .. |
| Total | 1,816 | 100.0 | 40.1 | 100.0 | 74.6 | 100.0 | 156.9 |
| British Columbia: | | | | | | | |
| High | 128 | 3.9 | 20.0 | 18.0 | 75.3 | 76.9 | .. |
| Medium | 471 | 14.3 | 14.0 | 12.6 | 5.7 | 5.8 | .. |
| Low | 2,689 | 81.8 | 77.3 | 69.4 | 16.9 | 17.3 | .. |
| Total | 3,288 | 100.0 | 111.3 | 100.0 | 97.9 | 100.0 | 943.0 |

^{1,2} See footnotes 1 and 4, Table 6.1.

Source: Special tabulations from the Manufacturing and Primary Industry Division, Statistics Canada; tabulations from the Industrial Water Use Survey, Water Planning and Management Branch, Fisheries and Environment Canada.

TABLE 6.3. Industrial Activity by Stressor Type,¹ by Census Metropolitan Area (CMA), 1973

| CMA (ranked by number of production workers) and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|--|----------------|----------|-----------|----------|---------------------------|----------|
| | number | per cent | thousands | per cent | 10 ¹² B.t.u.'s | per cent |
| Toronto: | | | | | | |
| High | 47 | 0.8 | 3.6 | 1.6 | 12.2 | 10.4 |
| Medium | 980 | 16.6 | 43.9 | 18.6 | 22.5 | 19.2 |
| Low | 4,868 | 82.6 | 188.2 | 79.8 | 82.3 | 70.4 |
| Total | 5,895 | 100.0 | 235.8 | 100.0 | 117.0 | 100.0 |
| Montréal: | | | | | | |
| High | 52 | 1.0 | 7.2 | 3.5 | 20.3 | 31.9 |
| Medium | 777 | 14.6 | 33.7 | 16.2 | 18.7 | 29.4 |
| Low | 4,500 | 84.4 | 167.4 | 80.3 | 24.6 | 38.7 |
| Total | 5,329 | 100.0 | 208.3 | 100.0 | 63.6 | 100.0 |
| Vancouver: | | | | | | |
| High | 38 | 2.0 | 2.5 | 4.6 | 8.2 | 45.1 |
| Medium | 296 | 15.1 | 9.6 | 17.4 | 3.5 | 19.2 |
| Low | 1,623 | 82.9 | 42.9 | 78.0 | 6.5 | 35.7 |
| Total | 1,957 | 100.0 | 54.9 | 100.0 | 18.2 | 100.0 |
| Hamilton: | | | | | | |
| High | 15 | 2.3 | 21.3 | 40.2 | 29.2 | 67.8 |
| Medium | 147 | 22.4 | 10.2 | 19.2 | 6.0 | 13.9 |
| Low | 495 | 75.3 | 21.6 | 40.6 | 7.9 | 18.3 |
| Total | 657 | 100.0 | 53.1 | 100.0 | 43.1 | 100.0 |
| Kitchener-Waterloo: | | | | | | |
| High | 4 | 0.8 | 0.1 | 0.4 | 0.1 | 1.2 |
| Medium | 105 | 20.5 | 9.9 | 26.4 | 3.5 | 43.8 |
| Low | 402 | 78.7 | 27.6 | 73.2 | 4.4 | 55.0 |
| Total | 511 | 100.0 | 37.6 | 100.0 | 8.0 | 100.0 |
| St. Catharines-Niagara: | | | | | | |
| High | 23 | 5.5 | 7.3 | 22.9 | 15.3 | 60.0 |
| Medium | 90 | 21.5 | 4.9 | 15.2 | 2.9 | 11.4 |
| Low | 306 | 73.0 | 19.9 | 61.9 | 7.3 | 28.6 |
| Total | 419 | 100.0 | 32.1 | 100.0 | 25.5 | 100.0 |
| Winnipeg: | | | | | | |
| High | 11 | 1.2 | 0.6 | 2.0 | 3.3 | 30.8 |
| Medium | 166 | 18.2 | 6.2 | 19.7 | 3.1 | 29.0 |
| Low | 734 | 80.6 | 24.8 | 78.3 | 4.3 | 40.2 |
| Total | 911 | 100.0 | 31.6 | 100.0 | 10.7 | 100.0 |
| Windsor: | | | | | | |
| High | 4 | 1.0 | 0.5 | 1.8 | 5.4 | 39.1 |
| Medium | 73 | 18.8 | 5.1 | 17.3 | 3.3 | 23.9 |
| Low | 311 | 80.2 | 24.0 | 80.9 | 5.1 | 37.0 |
| Total | 388 | 100.0 | 29.6 | 100.0 | 13.8 | 100.0 |
| London: | | | | | | |
| High | 7 | 1.8 | 0.1 | 0.5 | 0.1 | 1.8 |
| Medium | 56 | 14.7 | 2.9 | 12.3 | 1.6 | 28.6 |
| Low | 318 | 83.5 | 20.5 | 87.2 | 3.9 | 69.6 |
| Total | 381 | 100.0 | 23.5 | 100.0 | 5.6 | 100.0 |
| Québec: | | | | | | |
| High | 9 | 1.8 | 1.7 | 9.5 | 7.2 | 76.6 |
| Medium | 75 | 14.5 | 3.1 | 17.7 | 1.1 | 11.7 |
| Low | 432 | 83.7 | 12.7 | 72.8 | 1.1 | 11.7 |
| Total | 516 | 100.0 | 17.4 | 100.0 | 9.4 | 100.0 |
| Edmonton: | | | | | | |
| High | 23 | 3.7 | 2.3 | 14.1 | 24.9 | 68.8 |
| Medium | 116 | 18.8 | 4.8 | 29.4 | 8.8 | 24.3 |
| Low | 479 | 77.5 | 9.3 | 56.5 | 2.5 | 6.9 |
| Total | 618 | 100.0 | 16.4 | 100.0 | 36.2 | 100.0 |

See footnote(s) at end of table.

TABLE 6.3. Industrial Activity by Stressor Type,¹ by Census Metropolitan Area (CMA), 1973 - Concluded

| CMA (ranked by number of production workers) and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|--|----------------|--------------|-------------|--------------|---------------------------|--------------|
| | number | per cent | thousands | per cent | 10 ¹² B.t.u.'s | per cent |
| Ottawa-Hull: | | | | | | |
| High | 17 | 4.7 | 4.3 | 31.5 | 10.9 | 86.5 |
| Medium | 52 | 14.4 | 1.1 | 8.0 | 0.6 | 4.8 |
| Low | 292 | 80.9 | 8.2 | 60.5 | 1.1 | 8.7 |
| Total | 361 | 100.0 | 13.6 | 100.0 | 12.6 | 100.0 |
| Calgary: | | | | | | |
| High | 11 | 2.1 | 1.0 | 8.6 | 3.7 | 43.5 |
| Medium | 81 | 15.4 | 2.9 | 24.2 | 2.5 | 29.4 |
| Low | 435 | 82.5 | 8.0 | 67.2 | 2.3 | 27.1 |
| Total | 527 | 100.0 | 11.9 | 100.0 | 8.5 | 100.0 |
| Chicoutimi-Jonquière: | | | | | | |
| High | 7 | 7.5 | 6.0 | 80.7 | 11.7 | 95.1 |
| Medium | 17 | 18.3 | 0.3 | 4.6 | 0.5 | 4.1 |
| Low | 69 | 74.2 | 1.1 | 14.7 | 0.1 | 0.8 |
| Total | 93 | 100.0 | 7.5 | 100.0 | 12.3 | 100.0 |
| Thunder Bay: | | | | | | |
| High | 8 | 8.1 | 3.3 | 56.3 | 10.0 | 84.8 |
| Medium | 21 | 21.2 | 0.2 | 4.2 | 0.1 | 0.8 |
| Low | 70 | 70.7 | 2.3 | 39.5 | 1.7 | 14.4 |
| Total | 99 | 100.0 | 5.9 | 100.0 | 11.8 | 100.0 |
| Sudbury: | | | | | | |
| High | 8 | 11.3 | 5.0 | 88.4 | 25.6 | 98.4 |
| Medium | 15 | 21.1 | 0.2 | 3.3 | 0.2 | 0.8 |
| Low | 48 | 67.6 | 0.5 | 8.3 | 0.2 | 0.8 |
| Total | 71 | 100.0 | 5.6 | 100.0 | 26.0 | 100.0 |
| Saint John: | | | | | | |
| High | 6 | 7.1 | 1.4 | 25.1 | 6.2 | 73.0 |
| Medium | 13 | 15.3 | 0.4 | 7.4 | 0.3 | 3.5 |
| Low | 66 | 77.6 | 3.6 | 67.5 | 2.0 | 23.5 |
| Total | 85 | 100.0 | 5.4 | 100.0 | 8.5 | 100.0 |
| Halifax: | | | | | | |
| High | 7 | 4.9 | 0.3 | 7.1 | 0.1 | 5.7 |
| Medium | 18 | 12.6 | 0.9 | 18.5 | 0.4 | 37.7 |
| Low | 118 | 82.5 | 3.6 | 74.4 | 0.6 | 56.6 |
| Total | 143 | 100.0 | 4.8 | 100.0 | 1.1 | 100.0 |
| Regina: | | | | | | |
| High | 7 | 5.1 | 0.3 | 8.8 | 1.5 | 48.4 |
| Medium | 31 | 22.6 | 2.0 | 50.2 | 1.2 | 38.7 |
| Low | 99 | 72.3 | 1.6 | 41.0 | 0.4 | 12.9 |
| Total | 137 | 100.0 | 3.9 | 100.0 | 3.1 | 100.0 |
| Victoria: | | | | | | |
| High | 6 | 2.9 | 0.1 | 2.5 | 0.1 | 20.0 |
| Medium | 33 | 15.9 | 0.7 | 17.6 | 0.2 | 40.0 |
| Low | 169 | 81.2 | 3.1 | 79.9 | 0.2 | 40.0 |
| Total | 208 | 100.0 | 3.9 | 100.0 | 0.5 | 100.0 |
| Saskatoon: | | | | | | |
| High | 5 | 3.7 | 0.2 | 4.9 | 0.3 | 20.0 |
| Medium | 26 | 19.1 | 1.5 | 46.1 | 0.7 | 46.7 |
| Low | 105 | 77.2 | 1.6 | 49.0 | 0.5 | 33.3 |
| Total | 136 | 100.0 | 3.3 | 100.0 | 1.5 | 100.0 |
| St. John's: | | | | | | |
| High | 3 | 4.2 | 0.1 | 5.4 | 0.1 | 12.3 |
| Medium | 18 | 25.0 | 0.8 | 37.1 | 0.3 | 52.6 |
| Low | 51 | 70.8 | 1.3 | 57.5 | 0.2 | 35.1 |
| Total | 72 | 100.0 | 2.2 | 100.0 | 0.6 | 100.0 |

¹ See footnote 1, Table 6.1.

Source: Special tabulations from the Manufacturing and Primary Industries Division, Statistics Canada.

TABLE 6.4. Industrial Activity by Stressor Type, by Primary Watershed Division, 1973

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|-----------------------------------|----------------|----------|---------|----------|---------------------------|----------|
| | number | per cent | number | per cent | 10 ¹² B.t.u.'s | per cent |
| 10. Atlantic Ocean: | | | | | | |
| High | 16 | 2.9 | 2,352 | 14.2 | 5.6 | 65.9 |
| Medium | 150 | 27.2 | 6,976 | 42.1 | 1.7 | 20.0 |
| Low | 386 | 69.9 | 7,255 | 43.7 | 1.2 | 14.1 |
| Total | 552 | 100.0 | 16,583 | 100.0 | 8.5 | 100.0 |
| 11. Gulf of St. Lawrence: | | | | | | |
| High | 45 | 5.3 | 12,663 | 38.6 | 51.1 | 90.0 |
| Medium | 283 | 32.9 | 11,032 | 33.7 | 3.4 | 6.0 |
| Low | 531 | 61.8 | 9,061 | 27.7 | 2.3 | 4.0 |
| Total | 859 | 100.0 | 32,756 | 100.0 | 56.8 | 100.0 |
| 12. Bay of Fundy: | | | | | | |
| High | 9 | 2.6 | 694 | 6.3 | 2.9 | 46.1 |
| Medium | 102 | 29.7 | 3,707 | 33.7 | 1.3 | 20.6 |
| Low | 232 | 67.7 | 6,597 | 60.0 | 2.1 | 33.3 |
| Total | 343 | 100.0 | 10,998 | 100.0 | 6.3 | 100.0 |
| 13. Saint John River: | | | | | | |
| High | 11 | 3.4 | 2,139 | 16.2 | 13.3 | 75.6 |
| Medium | 53 | 16.4 | 2,108 | 16.0 | 1.6 | 9.1 |
| Low | 260 | 80.2 | 8,934 | 67.8 | 2.7 | 15.3 |
| Total | 324 | 100.0 | 13,181 | 100.0 | 17.6 | 100.0 |
| 14. St. Lawrence River: | | | | | | |
| High | 167 | 1.8 | 34,617 | 9.2 | 100.6 | 53.5 |
| Medium | 1,682 | 18.0 | 77,472 | 20.5 | 49.5 | 26.3 |
| Low | 7,497 | 80.2 | 265,671 | 70.3 | 37.9 | 20.2 |
| Total | 9,346 | 100.0 | 377,760 | 100.0 | 188.0 | 100.0 |
| 15. Ottawa River: | | | | | | |
| High | 33 | 3.1 | 7,874 | 20.3 | 30.1 | 81.1 |
| Medium | 214 | 20.2 | 7,151 | 18.4 | 3.0 | 8.1 |
| Low | 814 | 76.7 | 23,754 | 61.3 | 4.0 | 10.8 |
| Total | 1,061 | 100.0 | 38,779 | 100.0 | 37.1 | 100.0 |
| 16. Lake Ontario: | | | | | | |
| High | 107 | 1.4 | 34,405 | 9.5 | 68.2 | 32.5 |
| Medium | 1,392 | 18.1 | 66,084 | 18.2 | 35.4 | 16.8 |
| Low | 6,181 | 80.5 | 262,960 | 72.3 | 106.5 | 50.7 |
| Total | 7,680 | 100.0 | 363,449 | 100.0 | 210.1 | 100.0 |
| 17. Lake Erie and Lake St. Clair: | | | | | | |
| High | 51 | 2.0 | 2,693 | 1.8 | 19.8 | 32.9 |
| Medium | 594 | 23.7 | 33,399 | 22.1 | 17.0 | 28.3 |
| Low | 1,859 | 74.3 | 114,939 | 76.1 | 23.3 | 38.8 |
| Total | 2,504 | 100.0 | 151,031 | 100.0 | 60.1 | 100.0 |
| 18. Lake Huron: | | | | | | |
| High | 45 | 4.3 | 18,498 | 37.0 | 99.3 | 91.0 |
| Medium | 248 | 23.4 | 7,687 | 15.4 | 3.9 | 3.6 |
| Low | 765 | 72.3 | 23,813 | 47.6 | 5.9 | 5.4 |
| Total | 1,058 | 100.0 | 49,998 | 100.0 | 109.1 | 100.0 |
| 19. Lake Superior: | | | | | | |
| High | 11 | 9.7 | 4,729 | 63.4 | 19.6 | 91.1 |
| Medium | 22 | 19.5 | 246 | 3.3 | 0.1 | 0.4 |
| Low | 80 | 70.8 | 2,484 | 33.3 | 1.8 | 8.5 |
| Total | 113 | 100.0 | 7,459 | 100.0 | 21.5 | 100.0 |
| 20. East Hudson Bay and Ungava: | | | | | | |
| High | 3 | 27.3 | 400 | 53.1 | 3.0 | 97.7 |
| Medium | — | — | — | — | — | — |
| Low | 8 | 72.7 | 354 | 46.9 | 0.1 | 2.3 |
| Total | 11 | 100.0 | 754 | 100.0 | 3.1 | 100.0 |

TABLE 6.4. Industrial Activity by Stressor Type, by Primary Watershed Division, 1973 - Concluded

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|-------------------------------------|----------------|----------|---------|----------|---------------------------|----------|
| | number | per cent | number | per cent | 10 ¹² B.t.u.'s | per cent |
| 21. South and Southwest Hudson Bay: | | | | | | |
| High | 10 | 5.4 | 3,048 | 39.3 | 8.5 | 85.0 |
| Medium | 40 | 21.5 | 249 | 3.2 | 0.1 | 1.0 |
| Low. | 136 | 73.1 | 4,468 | 57.5 | 1.4 | 14.0 |
| Total | 186 | 100.0 | 7,765 | 100.0 | 10.0 | 100.0 |
| 22. Nelson River: | | | | | | |
| Total | 12 | 100.0 | 879 | 100.0 | 0.7 | 100.0 |
| 23. Lake Winnipeg: | | | | | | |
| High | 24 | 2.0 | 3,851 | 9.7 | 13.5 | 59.2 |
| Medium | 244 | 19.9 | 7,487 | 18.9 | 4.0 | 17.5 |
| Low. | 958 | 78.1 | 28,236 | 71.4 | 5.3 | 23.3 |
| Total | 1,226 | 100.0 | 39,574 | 100.0 | 22.8 | 100.0 |
| 24. Assiniboine River: | | | | | | |
| High | 25 | 5.6 | 642 | 8.6 | 2.5 | 46.3 |
| Medium | 113 | 25.2 | 3,040 | 40.9 | 2.1 | 38.9 |
| Low. | 310 | 69.2 | 3,758 | 50.5 | 0.8 | 14.8 |
| Total | 448 | 100.0 | 7,440 | 100.0 | 5.4 | 100.0 |
| 25. Saskatchewan River: | | | | | | |
| High | 89 | 4.5 | 5,536 | 12.7 | 59.1 | 71.8 |
| Medium | 438 | 22.0 | 12,883 | 29.7 | 14.8 | 18.0 |
| Low. | 1,460 | 73.5 | 25,006 | 57.6 | 8.4 | 10.2 |
| Total | 1,987 | 100.0 | 43,425 | 100.0 | 82.3 | 100.0 |
| 30. Mackenzie River: | | | | | | |
| Total | 12 | 100.0 | 109 | 100.0 | 0.3 | 100.0 |
| 31. Athabasca River: | | | | | | |
| High | 6 | 7.7 | 371 | 25.4 | 2.8 | 87.5 |
| Medium | 11 | 14.1 | 72 | 4.9 | -- | -- |
| Low. | 61 | 78.2 | 1,019 | 69.7 | 0.4 | 12.5 |
| Total | 78 | 100.0 | 1,462 | 100.0 | 3.2 | 100.0 |
| 32. Peace River: | | | | | | |
| High | 8 | 9.3 | 156 | 6.3 | 0.2 | 8.0 |
| Medium | 11 | 12.8 | 116 | 4.7 | 0.1 | 3.3 |
| Low. | 67 | 77.9 | 2,196 | 89.0 | 1.7 | 88.7 |
| Total | 86 | 100.0 | 2,468 | 100.0 | 2.0 | 100.0 |
| 40. Columbia River: | | | | | | |
| High | 21 | 5.5 | 3,456 | 25.7 | 7.8 | 67.8 |
| Medium | 51 | 13.5 | 1,083 | 8.1 | 1.0 | 8.7 |
| Low. | 307 | 81.0 | 8,891 | 66.2 | 2.7 | 23.5 |
| Total | 379 | 100.0 | 13,430 | 100.0 | 11.5 | 100.0 |
| 41. Fraser River: | | | | | | |
| High | 59 | 2.7 | 4,624 | 6.9 | 22.2 | 58.9 |
| Medium | 330 | 15.0 | 10,404 | 15.6 | 4.0 | 10.6 |
| Low. | 1,815 | 82.3 | 51,651 | 77.5 | 11.5 | 30.5 |
| Total | 2,204 | 100.0 | 66,679 | 100.0 | 37.7 | 100.0 |
| 42. Yukon River: | | | | | | |
| Total | 6 | 100.0 | 23 | 100.0 | 0.005 | 100.0 |
| 43. West Coast: | | | | | | |
| High | 43 | 6.5 | 11,776 | 39.6 | 45.1 | 95.6 |
| Medium | 88 | 13.2 | 2,492 | 8.4 | 0.6 | 1.3 |
| Low. | 533 | 80.3 | 15,439 | 52.0 | 1.5 | 3.1 |
| Total | 664 | 100.0 | 29,707 | 100.0 | 47.2 | 100.0 |

Source: Unpublished data prepared by Statistics Canada.

TABLE 6.5. Water Use in the Manufacturing Industries by Stressor Type, 1972

| | Stressor type | | | Total manufacturing industries |
|---|-----------------------------|------------|------------|--------------------------------|
| | High | Medium | Low | |
| Number of establishments surveyed ¹ | 519 | 1,944 | 1,974 | 4,437 |
| Gross water use (millions of gallons per day) ² | 10,926 | 927 | 1,215 | 13,068 |
| Use rate = $\frac{\text{gross water use}}{\text{water intake}}$ | 2.5 | 1.8 | 1.5 | 2.3 |
| Water intake by use: | millions of gallons per day | | | |
| Process | 2,146 | 209 | 412 | 2,767 |
| Cooling, condensing and steam | 2,069 | 272 | 335 | 2,676 |
| Sanitary | 31 | 26 | 38 | 96 |
| Other | 93 | 21 | 39 | 152 |
| Total | 4,339 | 528 | 824 | 5,691 |
| Intake source: | | | | |
| Fresh water | 4,122 | 480 | 771 | 5,373 |
| Public water system | 242 | 228 | 506 | 976 |
| Company surface system | 3,838 | 214 | 250 | 4,302 |
| Company ground water system | 42 | 38 | 15 | 95 |
| Brackish water | 177 | 47 | 52 | 276 |
| Company surface system | ... | 4 | 7 | 11 |
| Company ground water system | 1 | 3 | 1 | 5 |
| Other company source | 176 | 40 | 44 | 260 |
| Adjusting entry ³ | 40 | 1 | 1 | 42 |
| Total | 4,339 | 528 | 824 | 5,691 |
| Water discharge by point of discharge: | | | | |
| Public sewer | 135 | 218 | 169 | 522 |
| Fresh water body | 3,112 | 192 | 521 | 3,825 |
| Tide water body | 905 | 78 | 63 | 1,047 |
| Ground | 7 | 12 | 12 | 31 |
| Other | 10 | 1 | 3 | 15 |
| Total | 4,169 | 501 | 768 | 5,440 |
| Water treated before discharge | 1,417 | 63 | 80 | 1,560 |
| Percentage of water treated before discharge | 34.0 | 12.6 | 10.4 | 28.7 |

¹ The survey accounts for approximately 95% of total water intake by all manufacturing industries in that year. Firms indicating a total water withdrawal of 10 million gallons or more automatically received the water use questionnaire. Other firms were added to this list on the basis of special water use characteristics despite the fact that quantities of water intake may have been small.

² Gross water use is the total amount of water used in the production of a product; it is the sum of the total water intake and water recirculation.

³ An adjusting entry was necessary due to rounding in the imputation program.

Source: Unpublished data from the Economic Analysis Section, Water Planning and Management Branch, Fisheries and Environment Canada.

A High Stressor Industry: Smelter, Sudbury, Ontario



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

Airphoto — 6.7

Open Pit Mine: Asbestos, Quebec



Source: Original photo supplied by Surveys and Mapping
Branch, Department of Energy, Mines and Resources.

TABLE 6.8. Expenditures¹ on Pollution Abatement Equipment and Installation, by Industry, Accumulated Value 1969 - 75²

| Industry | Type of pollution abatement equipment | | | | | | | |
|--|---------------------------------------|---|---|--------------|------------------------------------|---|---|--------------|
| | Water | | | | Air | | | |
| | End of line treatment ³ | Conversion of production process ⁴ | Combination of treatments and other expenditures ⁵ | All types | End of line treatment ³ | Conversion of production process ⁴ | Combination of treatments and other expenditures ⁵ | All types |
| | per cent | | | | | | | |
| Agriculture. | 0.3 | ... | ... | 0.2 | ... | ... | ... | ... |
| Mining: | | | | | | | | |
| Metal mines | 1.6 | ... | 0.3 | 1.3 | ... | ... | ... | ... |
| Mineral fuels. | 4.8 | ... | 9.6 | 5.7 | 17.4 | 3.0 | 33.4 | 16.6 |
| Non-metal | ... | ... | ... | ... | 4.5 | 0.4 | 0.2 | 4.1 |
| Other mining | 0.7 | ... | 0.6 | 0.7 | 4.3 | ... | 0.2 | 3.9 |
| Total | 7.1 | ... | 10.5 | 7.7 | 26.2 | 3.4 | 33.8 | 24.6 |
| Manufacturing: | | | | | | | | |
| Food and beverage | 3.5 | ... | 0.2 | 2.8 | 4.0 | 10.8 | 3.7 | 4.5 |
| Wood industries. | ... | ... | ... | ... | 6.2 | 1.6 | 6.8 | 5.9 |
| Pulp and paper mills | 53.2 | 86.4 | 2.3 | 42.8 | 10.8 | 10.1 | 4.9 | 10.6 |
| Iron and steel mills | 13.5 | 3.8 | 0.4 | 10.4 | 12.3 | 19.4 | 6.9 | 12.7 |
| Other primary metal industries | ... | ... | ... | ... | 8.4 | 14.2 | 3.4 | 8.7 |
| Cement manufacturers | ... | ... | ... | ... | 7.7 | 1.4 | ... | 7.1 |
| Other non-metallic | ... | ... | ... | ... | 2.1 | 1.1 | ... | 2.0 |
| Petroleum refineries | 3.9 | ... | 1.5 | 3.3 | 1.6 | 0.2 | 3.8 | 1.5 |
| Industrial chemicals. | 5.0 | 6.8 | 79.6 | 21.3 | ... | ... | ... | ... |
| Chemical industries | ... | ... | ... | ... | 3.8 | 6.7 | 12.1 | 4.2 |
| Other manufacturing | 9.0 | 3.0 | 2.2 | 7.4 | 11.4 | 27.9 | 21.4 | 12.9 |
| Total | 88.1 | 100.0 | 86.2 | 88.0 | 68.3 | 93.4 | 63.0 | 70.1 |
| All other industries | 4.5 | ... | 3.3 | 4.1 | 5.5 | 3.2 | 3.2 | 5.3 |
| Total industries | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

¹ Includes only expenditures approved by the Department of Fisheries and the Environment.² Preliminary data only, figures for these years are not yet complete. For further information contact the Business Finance Division, Statistics Canada.³ Includes abatements at the point of discharge, for example, primary water treatment and treatment of air emissions.⁴ Includes either a change of inputs (for example, low sulphur fuel) or a change to a "less polluting process".⁵ Includes combined expenditures of end of line and process change, monitoring equipment and protection against accidental spillages.

Source: Unpublished data from Financial Taxation and General Research Section, Business Finance Division, Statistics Canada.

TABLE 6.9. Distribution of Expenditures on Air Pollution Abatement Equipment and Installation, Accumulated Value 1969-75,¹ by Region

| Industry | Atlantic provinces | Quebec | Ontario | Prairie provinces | British Columbia | Canada |
|--|--------------------|--------------|--------------|-------------------|------------------|--------------|
| per cent | | | | | | |
| Agriculture. | ... | ... | ... | ... | ... | ... |
| Mining: | | | | | | |
| Mineral fuels. | ... | ... | ... | 72.6 | ... | 16.6 |
| Non-metal mines | ... | 28.1 | 0.3 | ... | 1.8 | 4.1 |
| Other mining | ... | 4.1 | 7.3 | ... | ... | 3.9 |
| Total | ... | 32.2 | 7.6 | 72.6 | 1.8 | 24.6 |
| Manufacturing: | | | | | | |
| Food and beverage | 5.2 | 10.9 | 4.0 | 5.1 | 0.8 | 4.5 |
| Wood industries | 18.3 | 1.1 | 0.4 | 0.6 | 30.1 | 5.9 |
| Pulp and paper mills | 12.8 | 0.2 | 1.8 | 6.7 | 46.0 | 10.6 |
| Iron and steel industries | ... | 2.6 | 26.2 | 0.7 | 0.4 | 12.7 |
| Other primary metal industries | ... | 21.1 | 10.6 | 0.4 | 5.9 | 8.7 |
| Cement manufacturers | 32.3 | 8.1 | 12.4 | 0.9 | ... | 7.1 |
| Other non-metallic products. | ... | 5.4 | 2.5 | 0.1 | 0.6 | 2.0 |
| Petroleum refineries | 12.2 | 0.9 | 1.3 | 0.8 | 3.4 | 1.5 |
| Chemical industry. | ... | 10.8 | 4.9 | 0.3 | 2.7 | 4.2 |
| Other manufacturing | 9.6 | 3.2 | 26.5 | 0.6 | 0.4 | 12.9 |
| Total | 90.4 | 64.3 | 90.6 | 16.2 | 90.3 | 70.1 |
| All other industries | 9.6 | 3.5 | 1.8 | 11.2 | 7.9 | 5.3 |
| Total industries | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

¹ Preliminary data only.

Source: Same as in Table 6.8.

TABLE 6.10. Distribution of Expenditures on Water Pollution Abatement Equipment and Installation, Accumulated Value 1969-75,¹ by Region

| Industry | Atlantic provinces | Quebec | Ontario | Prairie provinces | British Columbia | Canada ² |
|-----------------------------------|--------------------|--------------|--------------|-------------------|------------------|---------------------|
| per cent | | | | | | |
| Agriculture. | ... | ... | 0.3 | 0.1 | ... | 0.2 |
| Mining: | | | | | | |
| Metal mines | ... | ... | 2.4 | ... | ... | 1.3 |
| Mineral fuels. | ³ ... | ... | ... | 33.1 | 0.2 | 5.7 |
| Other mining | ... | 0.3 | 0.1 | 2.6 | ... | 0.7 |
| Total | ... | 0.3 | 2.5 | 35.7 | 0.2 | 7.7 |
| Manufacturing: | | | | | | |
| Food and beverage | 1.3 | 8.8 | 2.3 | 1.6 | 1.6 | 2.8 |
| Pulp and paper mills | 95.7 | 68.1 | 23.9 | 41.5 | 87.8 | 42.8 |
| Iron and steel mills | ... | ... | 19.0 | ... | ⁴ ... | 10.4 |
| Petroleum refining | 2.1 | 1.6 | 3.6 | 2.9 | 4.4 | 3.3 |
| Industrial chemicals. | ⁵ ... | 13.5 | 35.9 | 0.5 | 0.2 | 21.3 |
| Other manufacturing | 0.5 | 7.1 | 11.1 | 0.6 | 3.1 | 7.4 |
| Total | 99.6 | 99.1 | 95.8 | 47.1 | 97.1 | 88.0 |
| All other industries | 0.4 | 0.6 | 1.4 | 17.1 | 2.7 | 4.1 |
| Total industries | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

¹ Preliminary data only.

² Includes data for the Yukon and Northwest Territories.

³ Confidential, included in the Prairie provinces.

⁴ Confidential, included in Ontario.

⁵ Confidential, included in Quebec.

Source: Same as in Table 6.8.

TABLE 6.11. Expenditures on Pollution Abatement Equipment and Installation by Type of Pollutant Abated, by Industry, Accumulated Value 1969 - 75¹

| Industry | Type of pollutant abated | | | | | | | | |
|--|---|--|--|-------------------------|----------------------|-----------------------------|---------------------------|-------------------------|--------------------|
| | Water | | | | | Air | | | |
| | Settleable and floating material ² | Oxygen demanding material ³ | Selected chemical compounds ⁴ | Other and not specified | All water pollutants | Selected gases ⁵ | Particulates ⁶ | Other and not specified | All air pollutants |
| | per cent | | | | | | | | |
| Agriculture | 0.1 | 0.6 | 0.1 | 1.2 | 0.2 | ... | ... | 0.1 | -- |
| Mining: | | | | | | | | | |
| Metal mines | 1.7 | 0.7 | ... | 3.6 | 1.3 | ... | ... | ... | ... |
| Mineral fuels | 5.0 | 1.0 | 10.4 | 1.2 | 5.7 | 46.7 | 2.5 | 6.4 | 16.6 |
| Non-metal | ... | ... | ... | ... | ... | 0.1 | 6.8 | 2.1 | 4.1 |
| Other mining | 0.3 | ... | 1.6 | 1.2 | 0.7 | 0.6 | 6.4 | 1.1 | 3.9 |
| Total | 7.0 | 1.7 | 12.0 | 6.0 | 7.7 | 47.4 | 15.7 | 9.6 | 24.6 |
| Manufacturing: | | | | | | | | | |
| Food and beverage | 0.9 | 16.8 | 0.4 | 4.7 | 2.8 | 1.1 | 3.6 | 15.8 | 4.5 |
| Wood industries | ... | ... | ... | ... | ... | ... | 10.6 | ... | 5.9 |
| Pulp and paper mills | 58.3 | 77.3 | 3.6 | 7.4 | 42.8 | 8.6 | 9.8 | 17.9 | 10.6 |
| Iron and steel mills | 11.4 | ... | 11.6 | 14.3 | 10.4 | 18.9 | 10.0 | 9.7 | 12.7 |
| Other primary metal industries | ... | ... | ... | ... | ... | 8.1 | 5.2 | 24.0 | 8.7 |
| Cement manufacturers | ... | ... | ... | ... | ... | ... | 12.8 | ... | 7.1 |
| Other non-metallic | ... | ... | ... | ... | ... | 0.7 | 3.2 | ... | 2.0 |
| Petroleum refineries | 1.8 | 2.4 | 0.7 | 27.6 | 3.3 | 2.2 | 1.2 | 1.1 | 1.5 |
| Industrial chemicals | 3.7 | 0.1 | 69.7 | 18.5 | 21.3 | ... | ... | ... | ... |
| Chemical industries | ... | ... | ... | ... | ... | 5.5 | 3.7 | 3.7 | 4.2 |
| Other manufacturing | 9.6 | 0.9 | 1.9 | 19.7 | 7.4 | 4.4 | 19.9 | 4.2 | 12.9 |
| Total | 85.7 | 97.5 | 87.9 | 92.2 | 88.0 | 49.5 | 80.0 | 76.4 | 70.1 |
| All other industries | 7.2 | 0.2 | ... | 0.6 | 4.1 | 3.1 | 4.3 | 13.9 | 5.3 |
| Total industries | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

¹ Preliminary data only.

² Settleable includes wood fibres, sludge and raw sewage; floating includes galley wastes, oil and grain.

³ Includes vegetable matter and biological and chemical oxygen demanding materials.

⁴ Includes sulphur, nitrogen and chlorine compounds and special toxic substances such as mercury and organic-mercury compounds.

⁵ Includes sulphur oxides, nitrogen oxides, hydrocarbon vapours and carbon monoxide.

⁶ Particulates include soot, oil mist, dusts and asbestos fibers.

Source: Same as in Table 6.8.

TABLE 6.12. Heavy Metals: Inputs in Manufacturing

| | Metallic cadmium | Metallic mercury | Tellurium | Selenium | Nickel | Lead | Zinc |
|----------------|------------------|------------------|-----------|----------|--------|---------|---------|
| | pounds | | | | tons | | |
| 1960 | 190,416 | 139,627 | 4,238 | 14,461 | 4,861 | 67,065 | 59,147 |
| 1961 | 170,976 | 150,588 | 4,843 | 13,160 | 4,935 | 72,187 | 63,754 |
| 1962 | 216,836 | 135,291 | 4,306 | 12,587 | 5,322 | 78,111 | 68,860 |
| 1963 | 208,596 | 147,396 | 1,853 | 14,281 | 5,866 | 79,192 | 75,591 |
| 1964 | 178,128 | 208,304 | 1,473 | 13,968 | 6,899 | 85,751 | 91,048 |
| 1965 | 171,558 | 415,996 | 1,870 | 15,888 | 8,924 | 96,483 | 96,792 |
| 1966 | 170,605 | 171,588 | 862 | 20,533 | 8,558 | 101,487 | 109,746 |
| 1967 | 156,761 | 245,121 | 981 | 21,017 | 8,767 | 91,688 | 110,487 |
| 1968 | 125,564 | 327,939 | 645 | 21,440 | 11,233 | 96,400 | 117,880 |
| 1969 | 132,136 | 258,814 | 3,532 | 15,572 | 12,094 | 98,227 | 120,697 |
| 1970 | 124,959 | 340,558 | 880 | 15,730 | 11,794 | 89,061 | 108,300 |
| 1971 | 117,395 | 193,968 | 1,178 | 15,686 | 8,583 | 88,450 | 120,572 |
| 1972 | 123,395 | 114,636 | 1,419 | 20,677 | 10,187 | 103,411 | 137,810 |
| 1973 | 120,958 | 72,663 | 1,222 | 22,435 | 11,862 | 104,574 | 128,294 |
| 1974 | 105,548 | 103,204 | 981 | 30,479 | 12,750 | 116,045 | 129,653 |
| 1975 | 84,234 | 72,467 | 1,354 | 21,900 | 12,465 | 95,343 | 108,335 |

Source: Catalogue 41-010, *Metals and Minerals*, Service Bulletin.

TABLE 6.13. Heavy Metals: Major End Use by Manufacturing Industries

| | 1961 | 1966 | 1971 | 1974 |
|--|----------|---------|---------|---------|
| | per cent | | | |
| Lead: ¹ | | | | |
| Production of: | | | | |
| Batteries and battery oxides | 39.0 | 38.7 | 39.7 | 45.4 |
| Chemicals | 20.6 | 16.5 | 19.3 | 16.4 |
| Other | 40.4 | 44.8 | 41.0 | 38.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Total production tons | 72,187 | 101,487 | 88,450 | 116,045 |
| Metallic cadmium: | | | | |
| Production of: | | | | |
| Plating | 86.2 | 78.8 | 74.0 | 71.9 |
| Solders | 10.8 | 8.5 | 3.7 | 2.3 |
| Other | 3.0 | 12.7 | 22.3 | 25.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Total production pounds | 170,976 | 170,605 | 117,395 | 105,548 |
| Metallic mercury: | | | | |
| Production of: | | | | |
| Heavy chemicals (electrolytic cells) | 64.0 | 85.1 | 93.8 | 58.5 |
| Electrical apparatus | 2.1 | 12.9 | 5.4 | 31.2 |
| Gold recovery | 2.7 | 1.3 | 0.5 | 0.4 |
| Other | 31.2 | 0.7 | 0.3 | 9.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Total production pounds | 150,588 | 171,588 | 193,968 | 103,204 |

¹ Includes white lead, red lead, litharge and tetra ethyl lead.

Source: Catalogue 41-010, *Metals and Minerals*, Service Bulletin (1961, 1966, 1971 and 1974).

TABLE 6.14. Vinyl Chloride Moxomer Used by Manufacturers of Plastics and Synthetic Resins

| | Thousands of tons | | Thousands of tons |
|----------------|----------------------|----------------|----------------------|
| 1962 | 14.2 | 1968 | 29.4 |
| 1963 | 17.3 | 1969 | 36.1 |
| 1964 | 22.9 | 1970 | 39.4 |
| 1965 | 21.2 | 1971 | 40.1 |
| 1966 | 26.5 | 1972 | 55.5 |
| 1967 | 27.6 | 1973 | 72.3 |
| | | 1974 | 77.3 |

Source: Unpublished data from Manufacturing and Primary Industry Division, Statistics Canada.

TABLE 6.15. Packaging Costs by Industry

| Industry | 1962 ¹ | 1966 | 1973 |
|--|-----------------------------|------------|--------------|
| | millions of current dollars | | |
| Food and beverage | 393 | 514 | 864 |
| Chemical and chemical products | 100 | 133 | 210 |
| Paper and allied products | 32 | 47 | 80 |
| Tobacco products | 29 | 36 | 44 |
| Electrical products | 15 | 24 | 43 |
| Metal fabricating | 16 | 21 | 40 |
| Non-metallic mineral products | 16 | 19 | 37 |
| Textile | 12 | 19 | 35 |
| Rubber and plastic products | 5 | 6 | 29 |
| All other industries | 69 | 109 | 181 |
| Total manufacturing | 687 | 928 | 1,563 |

¹ Data for 1962 are from a "Special Enquiry Into the Use of Containers and Other Packaging Materials and Supplies for 1962" and covered only those industries where their use was considered to be significant. Later data are from the Annual Census of Manufactures in which the coverage is more complete.

Source: Catalogues 31-502 and 31-212, *Consumption of Containers and Other Packaging Materials and Supplies by the Manufacturing Industries* (1962, 1966 and 1973).

TABLE 6.16. Packaging Costs by Type of Material

| Material | 1966 | 1972 | 1973 |
|--------------------------------|-----------------------------|----------------|----------------|
| | millions of current dollars | | |
| Paper ¹ | 402.7 | 625.8 | 708.2 |
| Metal ² | 171.0 | 322.6 | 361.1 |
| Glass | 81.1 | 144.8 | 156.9 |
| Plastic ³ | 54.6 | 120.3 | 130.4 |
| Wood ⁴ | 28.8 | 44.5 | 54.3 |
| Other | 187.9 | 125.5 | 152.3 |
| Total | 926.1 | 1,383.5 | 1,563.2 |

¹ Includes folding and rigid boxes, paperboard, corrugated boxes and cartons, paper or fiber cans and drums, paper bags, and paper labels, tags and wrappers.

² Includes cans, barrels, drums, staples, strapping wire, and lead, tin and aluminum foil lids.

³ Includes bottles and carboys, transparent film bags, transparent film, containers and lids.

⁴ Includes boxes, crates, barrels, kegs, crating lumber, pallets and skids.

Source: Catalogue 31-212, *Consumption of Containers and Other Packaging Supplies by the Manufacturing Industries* (1966, 1972 and 1973).

TABLE 6.17. Paper and Plastic Bags Produced and Shipped by Canadian Manufacturers

| | Paper bags | Plastic bags | Bags used per household | | Number of households |
|----------------|-------------------|--------------|-------------------------|--------------|----------------------|
| | | | Paper bags | Plastic bags | |
| | thousands of tons | | pounds | | thousands |
| 1964 | 177 | .. | 73 | .. | 4,872 |
| 1965 | 186 | .. | 74 | .. | 5,000 |
| 1966 | 194 | .. | 76 | .. | 5,126 |
| 1967 | 202 | 34 | 76 | 13 | 5,293 |
| 1968 | 197 | 41 | 72 | 15 | 5,458 |
| 1969 | 210 | 51 | 75 | 18 | 5,616 |
| 1970 | 217 | 59 | 75 | 20 | 5,784 |
| 1971 | 223 | 69 | 75 | 23 | 5,933 |
| 1972 | 226 | 73 | 74 | 24 | 6,108 |
| 1973 | 237 | 95 | 76 | 30 | 6,266 |

Source: Catalogue 36-207, *Paper and Plastic Bag Manufacturers*; Catalogue 64-202, *Household Facilities and Equipment Survey*.

TABLE 6.18. Bottles and Cans Used in the Soft Drink and Brewery Industries

| | Soft drink | | | Breweries | | | Number of households |
|----------------|--------------------------------|---------|------------------------------------|--------------------------------|--------|------------------------------------|----------------------|
| | Non-re- turnable bottles | Cans | Returnable ¹ bottles | Non-re- turnable bottles | Cans | Returnable ¹ bottles | |
| | thousands of dozens | | | | | | thousands |
| 1965 | .. | .. | .. | 1,434 | 5,389 | 9,922 | ... |
| 1966 | .. | .. | .. | 926 | 5,601 | 12,930 | ... |
| 1967 | .. | .. | .. | 1,281 | 6,627 | 14,259 | ... |
| 1968 | .. | 49,297 | 12,599 | 1,431 | 10,029 | 15,691 | ... |
| 1969 | 24,691 | 70,323 | 14,245 | 1,511 | 10,665 | 18,727 | ... |
| 1970 | 31,121 | 80,703 | 14,581 | 1,302 | 11,056 | 20,605 | ... |
| 1971 | 32,272 | 95,345 | 15,872 | 2,129 | 10,370 | 24,015 | ... |
| 1972 | 32,336 | 91,420 | 18,194 | 2,120 | 10,294 | 26,288 | ... |
| 1973 | 30,446 | 109,555 | 13,313 | 2,329 | 11,758 | 26,600 | ... |
| 1974 | 28,315 | 126,142 | 13,729 | 4,954 | 16,976 | 30,612 | ... |
| | dozens per household | | | | | | |
| 1965 | .. | .. | .. | 0.3 | 1.1 | 2.0 | 5,000 |
| 1966 | .. | .. | .. | 0.2 | 1.1 | 2.5 | 5,126 |
| 1967 | .. | .. | .. | 0.2 | 1.3 | 2.7 | 5,293 |
| 1968 | .. | 9.0 | 2.3 | 0.3 | 1.8 | 2.9 | 5,458 |
| 1969 | 4.4 | 12.8 | 2.5 | 0.3 | 1.9 | 3.3 | 5,616 |
| 1970 | 5.4 | 14.0 | 2.5 | 0.2 | 1.9 | 3.6 | 5,784 |
| 1971 | 5.4 | 16.1 | 2.7 | 0.4 | 1.7 | 4.0 | 5,933 |
| 1972 | 5.3 | 15.0 | 3.0 | 0.3 | 1.7 | 4.3 | 6,108 |
| 1973 | 4.9 | 17.5 | 2.1 | 0.4 | 1.9 | 4.2 | 6,266 |
| 1974 | 4.4 | 19.4 | 2.1 | 0.8 | 2.6 | 4.7 | 6,493 |

¹ Bought to replace broken bottles and to make up inventory shortages.

Source: Catalogue 32-208, *Soft Drink Manufacturers*; Catalogue 32-205, *Breweries*; Catalogue 64-202, *Household Facilities and Equipment Survey*.

TABLE 6.19. Soaps and Synthetic Detergents Shipped by Canadian Manufacturers

| | Shipments | | | Percentage of total shipments | | | Soap and de- tergents used per household | | Number of households |
|----------------|-------------------|-----------|-------|-------------------------------|-----------|-------|--|-----------|----------------------|
| | Soap | Detergent | Total | Soap | Detergent | Total | Soap | Detergent | |
| | thousands of tons | | | | | | pounds | | thousands |
| 1953 | 91 | 57 | 148 | 61.5 | 38.5 | 100.0 | 49.9 | 31.3 | 3,641 |
| 1956 | 77 | 78 | 155 | 49.8 | 50.2 | 100.0 | 39.0 | 39.5 | 3,948 |
| 1961 | 63 | 123 | 186 | 33.9 | 66.1 | 100.0 | 27.7 | 54.0 | 4,555 |
| 1966 | 53 | 201 | 254 | 20.9 | 79.1 | 100.0 | 20.7 | 78.4 | 5,126 |
| 1971 | 50 | 219 | 269 | 18.6 | 81.4 | 100.0 | 16.9 | 73.8 | 5,933 |
| 1973 | 55 | 250 | 305 | 18.1 | 81.9 | 100.0 | 17.6 | 79.8 | 6,266 |
| 1974 | 57 | 259 | 316 | 18.0 | 82.0 | 100.0 | 17.6 | 79.8 | 6,493 |

Source: Catalogue 46-214, *Manufacturers of Soap and Cleaning Compounds*; Catalogue 64-202, *Household Facilities and Equipment Survey*.

Chart — 6.20

Soaps and Synthetic Detergents: Shipments by Canadian Manufacturers

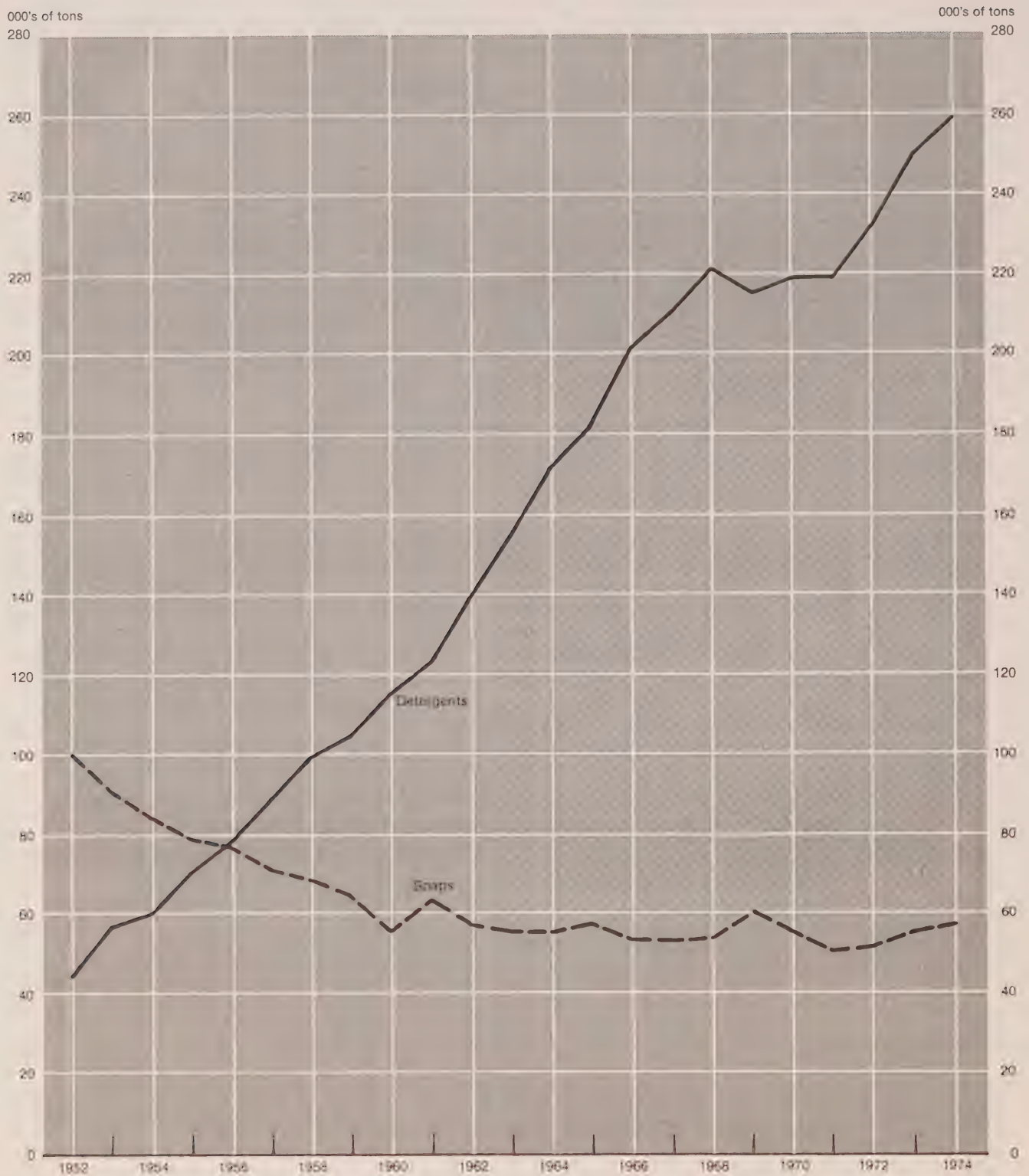


TABLE 6.21. Household Ownership of Consumer Products with High Energy Demands and Environmental Impacts

| | Clothes dryers | | Air conditioners | | Dish-washers | Outboard motors | | Snowmobiles | | Number of households |
|----------------|-------------------------------|-----|------------------|---------|--------------|-----------------|-------------|-------------|-------------|----------------------|
| | Electric | Gas | Window | Central | | One | Two or more | One | Two or more | |
| | per cent of households owning | | | | | | | | | thousands |
| 1960 | 11.4 | 0.7 | .. | .. | .. | 7.2 | .. | .. | .. | 4,404 |
| 1961 | 13.7 | 0.9 | .. | .. | 1.5 | .. | .. | .. | .. | 4,489 |
| 1962 | 17.3 | 1.2 | 1.7 | .. | 1.7 | 8.2 | .. | .. | .. | 4,592 |
| 1963 | 20.0 | 1.6 | 1.9 | .. | 2.1 | .. | .. | .. | .. | 4,671 |
| 1964 | 22.2 | 1.7 | 2.1 | .. | 2.2 | 8.6 | .. | .. | .. | 4,872 |
| 1965 | 25.2 | 2.2 | 2.2 | .. | 2.7 | .. | .. | .. | .. | 5,000 |
| 1966 | 27.4 | 2.6 | 2.6 | .. | 3.2 | 9.4 | .. | .. | .. | 5,126 |
| 1967 | 31.7 | 2.7 | 3.2 | .. | 4.4 | .. | .. | .. | .. | 5,293 |
| 1968 | 33.9 | 2.9 | 3.2 | .. | 5.1 | 8.1 | 1.5 | .. | .. | 5,458 |
| 1969 | 37.3 | 3.2 | 3.9 | .. | 6.5 | .. | .. | .. | .. | 5,616 |
| 1970 | 40.8 | 3.5 | 4.3 | .. | 7.5 | 8.8 | 1.7 | .. | .. | 5,784 |
| 1971 | 40.7 | 3.4 | 5.3 | .. | 8.6 | .. | .. | 6.3 | 1.1 | 5,933 |
| 1972 | 42.1 | 3.5 | 5.8 | .. | 9.2 | 9.3 | 1.6 | 6.7 | 1.6 | 6,108 |
| 1973 | 44.3 | 3.4 | 6.7 | .. | 10.7 | .. | .. | 7.3 | 1.8 | 6,266 |
| 1974 | 44.6 | 3.7 | 7.6 | 2.6 | 12.9 | 8.7 | 1.6 | 7.1 | 2.2 | 6,493 |
| 1975 | 48.1 | 3.6 | 9.2 | 3.2 | 15.2 | .. | .. | 7.4 | 2.6 | 6,703 |

Source: Catalogue 64-202, *Household Facilities and Equipment Survey* (1960-1965 and 1972-1975); unpublished revised estimates by the Consumer Income and Expenditure Division, Statistics Canada.

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ENERGY

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Energy in the Economy

It was once sufficient for the statistician documenting the role of energy in a nation's economy to compile the price and quantity of various fuels produced and the amount of capital invested in the energy-producing industry. During recent years, however, the critical importance of energy in the total economic system has become clear. Besides the large amounts of energy consumed in the energy-production process, there is energy content in the production of all goods and services produced by the economy. For this reason, the demand for energy is determined not only by its price in comparison with that of other goods, but by the level of total activity in the economy.

To assess the economics of energy, it is necessary to look at the processes that determine its supply. Most energy sources currently exploited are finite in nature. They are different, however, from other so-called exhaustible natural resources whose scarcity is usually due to the growth of population or change in technology. Through recycling, resources such as land, diamonds and copper can be made to serve one generation after another. This, however, is not the case with most current sources of energy. The stocks of most available energy sources are diminishing constantly and cannot be recycled, since the properties of the substance serving as the energy source are changed to result in heat and light. Indeed, its supply is made even scarcer through the recycling of all other resources, a process that consumes large amounts of energy.

The Concept and Measurement of Energy

Mankind uses energy in two ways: first, to provide heat and second, to move material objects and to transmit electromagnetic signals. While the precise terms for this second form are kinetic energy and electromagnetic energy, they will be referred to in this chapter as work.

Heat transfer is seen in the burning of fuel oil in a furnace to heat a house. Application of energy in the form of work occurs when fuel is burned to make an object, such as a car, assume a desired state of motion. While the same quantities of energy may be absorbed in each of the two instances, the minimum amounts of energy that must be withdrawn from the fuels to ensure the transfers are different.

Energy in the form of work can always be converted to an equal amount of heat, but only a fraction of energy available as heat can be converted to work. It should therefore be noted that the best equivalent figures for all energy shown in this chapter are the theoretically measurable amounts available.

Furthermore, the figures contained here are the gross constant volume heating value of 25°C of all the fossil fuels involved and the B.t.u. heat equivalents of all the primary electricity generated.

Classification of Energy Sources

All energy available for human use may be placed in one of two categories: renewable and non-renewable.

1. Energy in the first category is obtained by diverting a part of the many energy flows that continuously take place among various systems of the natural environment. Most of these natural processes are cyclical in nature with varying periodicities; by far the most important ones are those based on absorption of radiation originating in the sun. Examples of this are the daily cycle, the cyclical storage of potential energy in river systems, the annual vegetation cycle and the still longer forest regeneration cycle. Since energy flows in this category are more or less steady state, they can provide energy sources that may be utilized on a permanent basis. These are renewable sources.
2. In the natural state, part of the available energy flow is often trapped in various subsystems of the physical environment. In this manner, enormous amounts of available energy may accumulate in highly concentrated and stable forms over a period of time. From an economic perspective, the various deposits of fossil fuels are the most important examples of energy available in this category. When assessing quantities of energy available from this type of source, the most significant criterion to keep in mind is the comparison of the time it takes the various organic materials involved to become fuels with that of their rate of depletion. Typically, the accumulation process of coal or petroleum takes place over millions of years, while the same energy source may be exhausted during one human lifetime. Resources in this category are, for man's purposes, non-renewable.

In an economic context, energy can be classified by the degree of processing or transformation it undergoes before its final application. In this distinction there are primary and secondary energies. Primary forms of energy are determined by adding the heating value of all fuels and electricity at the first stage where they become a source of energy. Energy from nuclear and hydraulic sources are included as measured by the value of the B.t.u. heating equivalents of the electricity generated from them. Crude petroleum is included at the nominal conversion rate of 5.8×10 B.t.u. heat equivalent per barrel. Energy derived from fossil fuels and applied as electricity is counted as the heat equivalent of the fuels consumed in its generation and not as the heating value of the electricity generated. This also applies to primary stage measurements in refined products.

Secondary sources of energy, as the term implies, take into account processing, refinement or transformation. For example, the heating value of motor gasoline may be determined in its refined form and the heating value of electricity generated from fossil fuels is measured as the B.t.u. heating equivalent of the electricity generated; not as the heating value of the fossil fuels consumed during generation.

Definition of Technical Terms

Heat content of fuels and electricity denotes the quantity of energy in British Thermal Units. This quantity may be taken as the gross constant volume heating value of 25°C of all the fossil fuels involved. The conversion factors linking the heat content with the mass units of the various fuels are listed. The estimate used for wood was 20 million B.t.u.'s/cord. The heating value of electricity was set through the conversion factor of 3,412 B.t.u.'s per 1,000 kilowatt hours.

Primary energy consists of energy of coal, liquefied petroleum gas, natural gas, wood and crude petroleum as measured by the heat content defined above. For crude petroleum the conversion factor used was 5.8 million B.t.u.'s per barrel of 35 Canadian gallons. Hydraulic, nuclear and wood-generated electricity was measured by the B.t.u. equivalent of the electricity generated. For water and nuclear power, it would be technically difficult to determine a scaled energy conversion factor.

Secondary energy consists of energy in the form of fuel or electricity that is in turn derived from one or more primary energy sources through a process of refining, conversion or transformation. Such energy is measured as the heat content of the final secondary product. Examples are coke, diesel fuel oil, or electricity generated from fossil fuels.

Domestic availability of fuels and electricity is a measure of energy supply computed as follows: in any one year, take the heat content of all energy produced domestically in primary forms. Account for the change in stocks. Add the imports in both primary and secondary forms. Subtract the heat content of energy exports in both primary and secondary forms. The resulting figure is a good measure of the maximum potential heat content of all fuels available domestically. Traditionally, except in 1973, Canada has been a net importer of energy in secondary forms.

Renewable source energy is derived from wood or hydro power. Electricity from the combustion of wood is included, but is measured as the B.t.u. equivalent of the electricity generated, since no precise figures are available for the amount of wood used.

Non-renewable source energy is derived from all sources not included among renewable sources.

Energy consumption – While domestic availability measures the supply of energy as closely as possible to the primary stage, energy consumption attempts to measure the heat content of fuels and electricity in the form in which they are actually consumed. For example, only that part of the coal supply that is burned as coal is counted at the rate of primary heat content of coal. Energy originally derived from coal that can be traced as

being applied in the form of electricity in final use is counted as heat content of the electricity consumed. It should be noted, too, that transmission losses of electricity are included in total consumption, in the category of the energy supply industry.

Energy conversion describes the process of changing a primary source of energy such as coal into secondary energy forms.

Energy transformation refers to the process of changing secondary energy sources into other secondary energy sources; for example, obtaining electricity from fuel-oil-fired generating stations.

Net electrical generating capability measures the expected power of all available generating facilities of the nation, or a province, at the time of one hour firm peak load for each of the respondents. Generating capability is different from generating capacity, which refers to the theoretical capacity of the equipment, while the former takes into account factors such as the water level of the flow feeding the turbines, ice conditions, or the impossibility of placing all equipment in an installation on line at the same time. The category "net" excludes power used in station service.

Firm power peak load – Firm refers to power under firm contract or the best estimate of firm obligations in the absence of contracts. Peak loads include line losses and the manufacturing plant's own consumption, but do not include generating station service. Also excluded is secondary or surplus power to the ultimate customers on an interruptive basis.

Indicated shortage is a measure of firm power commitments a system was unable to meet at the time of its peak load.

Total indicated firm power peak load is the sum of firm power peak load and indicated shortage.

Total net capability includes total net generating capability along with total receipts of power from outside, less total deliveries of power to outside the geographical area concerned. Receipts and deliveries are counted at the time of one hour firm power peak load of the exporting or importing grid. Since there may be several grids within a province, the components contributing to the provincial or national total may not be synchronously defined. Receipts and deliveries may refer to electricity crossing either provincial or international boundaries.

Net generation refers to electricity generated and available at the generating station gate after electricity used in station service has been deducted. Line losses occurring subsequently are included. Generation is measured in units of energy such as kilowatt hours while

generating capability involves quantities of power (that is, rate of energy transfer with respect to time) measured in units such as kilowatts.

The Data and Their Sources

The data in this chapter highlight the use of energy in the economy. Information on production of energy is presented in exhibits 7.1 to 7.7. Energy consumption is examined in the section from Tables 7.8 to 7.25. In several cases, data are disaggregated to the industrial group level, as in Tables 7.20 to 7.23. These tables present an accurate picture of energy needs by industry as well as giving an indication of activities potentially most severely affected by periods of energy shortage.

Tables 7.26 to 7.28 deal with efficiency of energy conversion. Some specific energy sources are examined in the remaining tables. It will be noted that these are presently commercially exploited sources as opposed to those with future potential. An energy source such as the sun, given the necessary technology, would provide an essentially inexhaustible power supply for much of man's future energy requirements.

In selecting the energy-related statistics for this volume, the guiding principle has been to place into long-term perspective the current trends in availability and consumption of energy. This has necessitated using some data not originating with Statistics Canada and compiling some historical series despite some gaps.

Most of the data before 1926 came from Urquhart and Buckley's *Historical Statistics of Canada*, while much of the data on the use of wood came from the publication, *Canadian Energy Prospects*.

All data from 1926 - 52 were selected from two special papers issued by the Dominion Bureau of Statistics in 1956 and 1957. Most of the aggregate data in the long-term historical series relating to 1958 and later were taken from *Detailed Energy Supply and Demand in Canada*. Some historical series and information on petroleum and natural gas were obtained from provincial government sources. Data on oil and gas reserves came from the Canadian Petroleum Association.

Consumption of energy by various levels of government is included in the commercial sector. Estimates for the domestic sector are based on the number of households using various types of fuel or electricity as their main source of heat. In the case of wood, consumption of 150 million B.t.u.'s per year per household was assumed.

Losses and Adjustments

Detailed Energy Supply and Demand in Canada identifies a balancing entry to make figures for the total supply of energy conform with the totals on known consumption. This information has been omitted from the tables, except in Table 7.16, where it is shown to provide some measure of the data's precision.

Conversion of Mass Units of Fuel to B.t.u.'s

While there may be differences between the conversion factors shown in this publication and those used elsewhere to convert data from earlier time periods, we believe any discrepancies to be insignificant when considered in relation to the precision of the aggregate statistics available.

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Fuel Conversion Factors, Internal Report, FMP 62/28 (1962), Fuels and Mining Practice Division, Department of Energy, Mines and Resources.

Natural Units and the B.t.u. Conversion Factors for Fuel Types

| Fuel type | Natural unit | Conversion factor |
|-----------------------------------|--------------------------------|----------------------|
| | | millions of B.t.u.'s |
| Coal: | | |
| Anthracite | short tons of 2,000 pounds | 25.40 |
| Imported bituminous | " " " " " | 25.80 |
| Canadian bituminous | " " " " " | 25.20 |
| Sub-bituminous | " " " " " | 17.00 |
| Lignite | " " " " " | 13.20 |
| Coke | " " " " " | 24.80 |
| Coke oven gas | thousands of cubic feet | 0.50 |
| Liquefied petroleum gas | barrels of 35 Canadian gallons | 4.10 |
| Crude oil | " " " " " | 5.80 |
| Still gas | " " " " " | 6.29 |
| Motor gasoline | " " " " " | 5.22 |
| Kerosene | " " " " " | 5.68 |
| Diesel fuel | " " " " " | 5.83 |
| Light fuel oil | " " " " " | 5.83 |
| Heavy fuel oil | " " " " " | 6.29 |
| Petroleum coke | " " " " " | 6.39 |
| Aviation gasoline | " " " " " | 5.05 |
| Aviation turbo fuel | " " " " " | 5.41 |
| Natural gas | thousands of cubic feet | 1.00 |
| Electricity | thousands of kilowatt hours | 3.41 |

TABLE 7.1. Heat Content of Domestically Available Fuels and Electricity¹

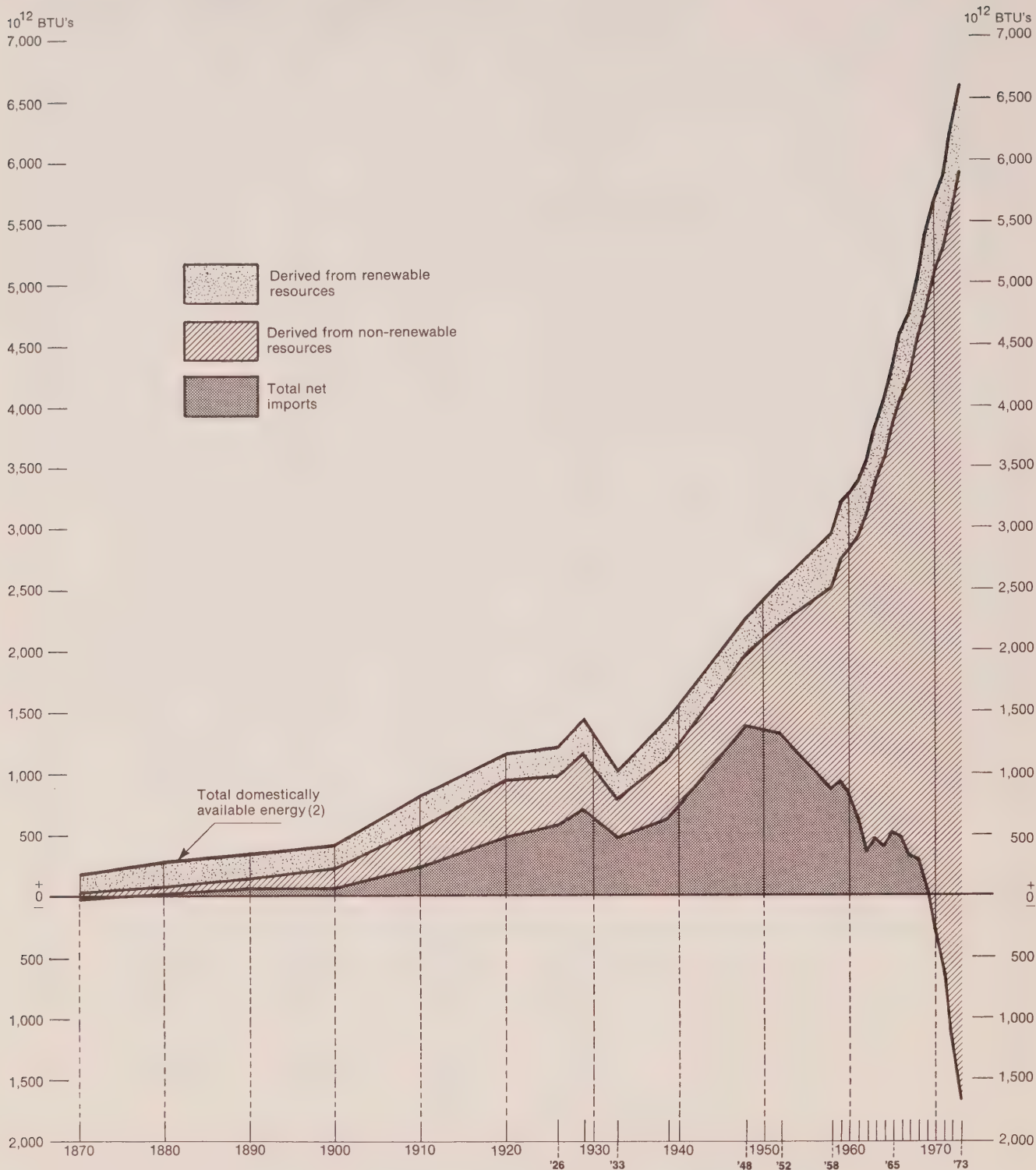
| | Domestic production of primary energy | Total exports of primary and secondary energy | Total imports of primary and secondary energy | Imports less exports | Heat content of domestically available fuels and electricity |
|-----------------------------|---|--|--|-------------------------|---|
| | 10 ¹² B.t.u.'s | | | | |
| 1870 | 195 | 7 | — | — 7 | 188 |
| 1880 | 258 | 8 | 26 | 18 | 276 |
| 1890 | 290 | 18 | 72 | 54 | 344 |
| 1900 | 334 | 44 | 119 | 75 | 409 |
| 1910 | 578 | 58 | 293 | 235 | 813 |
| 1920 | 635 | 63 | 555 | 491 | 1,126 |
| 1926 | 616 | 39 | 635 | 596 | 1,212 |
| 1929 | 716 | 35 | 754 | 719 | 1,435 |
| 1933 | 546 | 12 | 504 | 492 | 1,038 |
| 1939 | 810 | 22 | 638 | 616 | 1,426 |
| 1948 | 863 | 59 | 1,448 | 1,389 | 2,252 |
| 1952 | 1,252 | 50 | 1,359 | 1,309 | 2,561 |
| 1958 | 2,087 | 307 | 1,167 | 860 | 2,947 |
| 1959 | 2,285 | 334 | 1,260 | 926 | 3,211 |
| 1960 | 2,426 | 418 | 1,265 | 847 | 3,273 |
| 1961 | 2,754 | 624 | 1,263 | 639 | 3,393 |
| 1962 | 3,198 | 927 | 1,290 | 363 | 3,561 |
| 1963 | 3,339 | 972 | 1,437 | 465 | 3,804 |
| 1964 | 3,634 | 1,085 | 1,494 | 409 | 4,043 |
| 1965 | 3,818 | 1,126 | 1,641 | 515 | 4,333 |
| 1966 | 4,112 | 1,272 | 1,755 | 483 | 4,595 |
| 1967 | 4,405 | 1,504 | 1,835 | 331 | 4,736 |
| 1968 | 4,796 | 1,715 | 2,018 | 303 | 5,099 |
| 1969 | 5,308 | 1,998 | 2,028 | 30 | 5,338 |
| 1970 | 5,998 | 2,453 | 2,151 | — 302 | 5,696 |
| 1971 | 6,549 | 2,884 | 2,231 | — 653 | 5,896 |
| 1972 | 7,391 | 3,632 | 2,476 | — 1,156 | 6,235 |
| 1973 | 8,270 | 4,158 | 2,494 | — 1,664 | 6,606 |
| 1974 ^P | 8,156 | 3,560 | 2,264 | — 1,242 | 6,761 |
| 1975 ^P | 7,539 | 2,986 | 2,191 | — 795 | 6,744 |

¹ Maximum potential heat content of domestically available energy is defined as the simple thermal equivalents of the total production of primary energy (including those of coal, liquified petroleum gases, natural gas, wood, hydro and nuclear electricity and of crude oil, the latter counted at 5,803 million B.t.u.'s per barrel) plus the thermal equivalent of total primary and secondary energy imports less the thermal equivalent of total primary and secondary energy exports.

Source: Urquhart and Buckley, eds., *Historical Statistics of Canada*, Toronto, MacMillan Company of Canada, 1965; Catalogue 26-501, *Canadian Mineral Statistics, 1886 - 1956* (1957); Catalogue 26-201, *General Review of the Mining Industry*; Catalogue 65-004 *Exports by Commodities*; Catalogue 65-007, *Imports by Commodities*; Catalogues 57-505 and 57-207, *Detailed Energy Supply and Demand in Canada*; Catalogue 13-506, *Energy Sources in Canada, Commodity Accounts for 1948 and 1952*, Reference Paper No. 69 (1956); Catalogue 13-507, *Energy Sources in Canada, Commodity Statements for 1926, 1929, 1933 and 1939*, Reference Paper No. 74 (1957).

Chart - 7.2

Heat Content of Domestically Available Fuels and Electricity (1)



(1) See footnote (1), Table 7.1.

(2) The top line shows Total Domestically Available Energy, always measured from the zero base line. The distance between the top line and the Total Net Imports line represents Domestic Production and is further subdivided into renewable and non-renewable sources, a distinction not made for imported energy. Since exports have exceeded imports between 1970 and 1975, Net Imports are negative during this period; however, the difference between the top line and the Net Imports line still denotes a positive quantity. The region of the chart representing domestic production derived from non-renewable sources and extending below the zero base line is not meant to indicate a negative sign.

Source: Same as in Table 7.1.

TABLE 7.3. Average Heat Content Per Person¹ of Domestically Available Fuels and Electricity

| | Domestic production of primary energy | Domestic produc- tion of energy derived from renewable sources | Imports less exports | Heat content of domestically avail- able fuel and electricity |
|-----------------|---|---|-------------------------|--|
| | millions of B.t.u.'s per person | | | |
| 1870 | 54 | 48 | - 2 | 52 |
| 1880 | 61 | 52 | 4 | 65 |
| 1890 | 61 | 44 | 11 | 72 |
| 1900 | 63 | 35 | 14 | 77 |
| 1910 | 82 | 36 | 34 | 116 |
| 1920 | 75 | 24 | 60 | 135 |
| 1926 | 65 | 25 | 63 | 128 |
| 1929 | 71 | 27 | 72 | 143 |
| 1933 | 51 | 23 | 46 | 97 |
| 1939 | 72 | 28 | 55 | 127 |
| 1948 | 67 | 23 | 108 | 175 |
| 1952 | 87 | 23 | 90 | 177 |
| 1958 | 122 | 26 | 50 | 172 |
| 1959 | 131 | 26 | 53 | 184 |
| 1960 | 136 | 27 | 47 | 183 |
| 1961 | 151 | 26 | 35 | 186 |
| 1962 | 172 | 25 | 20 | 192 |
| 1963 | 176 | 24 | 25 | 201 |
| 1964 | 188 | 25 | 21 | 209 |
| 1965 | 194 | 24 | 26 | 220 |
| 1966 | 205 | 26 | 24 | 229 |
| 1967 | 216 | 25 | 16 | 232 |
| 1968 | 232 | 25 | 15 | 247 |
| 1969 | 253 | 27 | 1 | 254 |
| 1970 | 282 | 28 | - 14 | 268 |
| 1971 | 304 | 28 | - 30 | 274 |
| 1972 | 339 | 30 | - 53 | 286 |
| 1973 | 374 | 32 | - 75 | 299 |
| 1974P | 363 | .. | - 55 | 308 |
| 1975P | 331 | .. | - 35 | 296 |

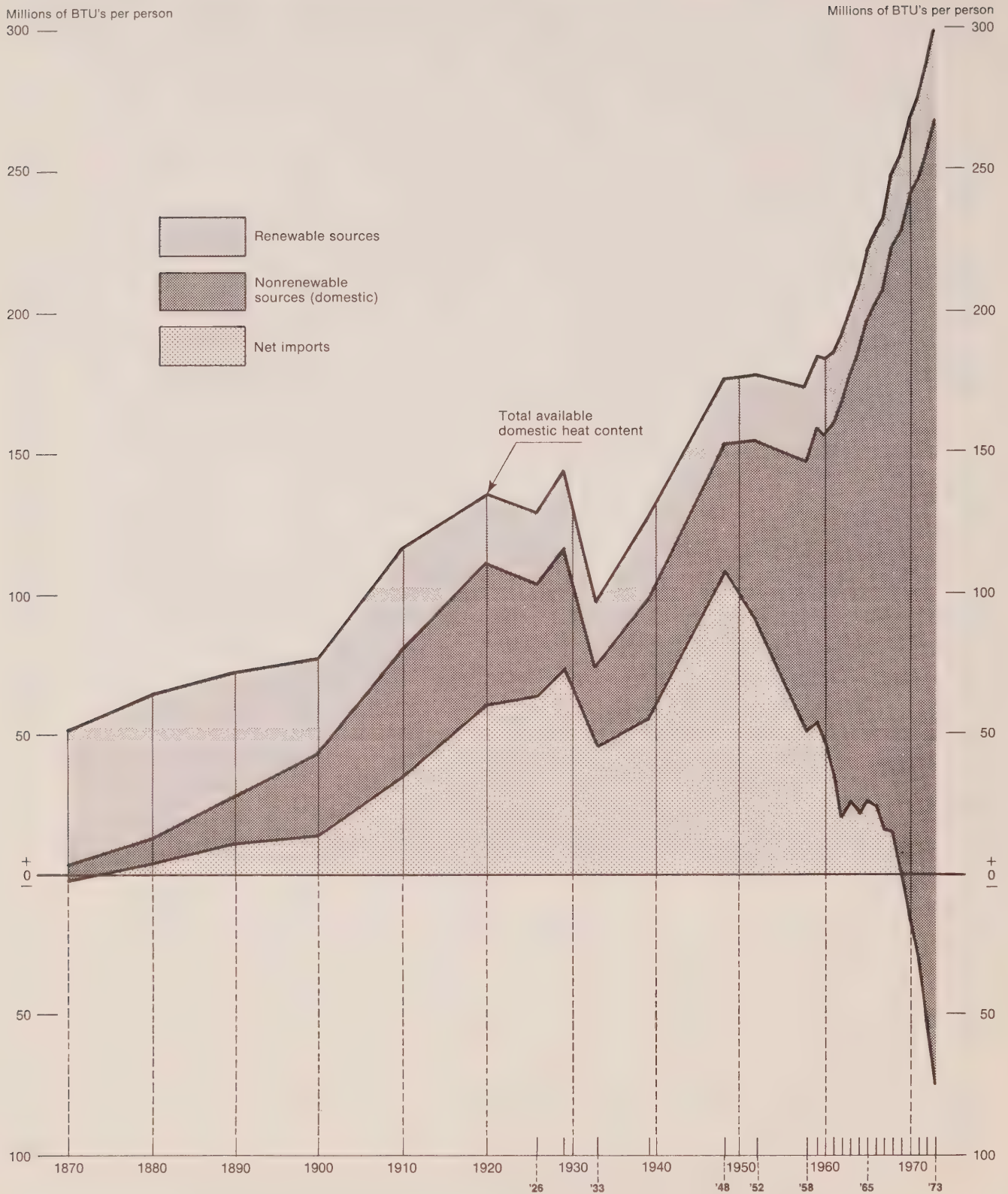
¹ All quantities in this table are defined as those in Table 7.1, except they are divided by the total population for the appropriate year.

Source: Same as in Table 7.1.

Chart — 7.4

Average Heat Content per Person of Domestically Available Fuels and Electricity

Millions of BTU's per person
300 —



Source: Same as in Table 7.1.

TABLE 7.5. Percentage of Domestically Available Energy Derived from Renewable and Non-renewable Sources and from Trade With the Rest of the World

| | Domestic production from renewable sources ¹ | Domestic production from non-renewable sources | Imports less exports | Total |
|----------------|---|--|----------------------|-------|
| | per cent ² | | | |
| 1870 | 93.2 | 10.5 | – 3.7 | 100.0 |
| 1880 | 79.7 | 13.8 | 6.5 | 100.0 |
| 1890 | 61.1 | 23.1 | 15.8 | 100.0 |
| 1900 | 45.9 | 35.9 | 18.2 | 100.0 |
| 1910 | 31.3 | 39.8 | 28.9 | 100.0 |
| 1920 | 18.2 | 38.2 | 43.6 | 100.0 |
| 1926 | 19.2 | 31.6 | 49.2 | 100.0 |
| 1929 | 18.8 | 31.1 | 50.1 | 100.0 |
| 1933 | 23.4 | 29.2 | 47.4 | 100.0 |
| 1939 | 22.1 | 34.7 | 43.2 | 100.0 |
| 1948 | 13.0 | 25.3 | 61.7 | 100.0 |
| 1952 | 13.1 | 35.8 | 51.1 | 100.0 |
| 1958 | 14.9 | 55.9 | 29.2 | 100.0 |
| 1959 | 14.2 | 57.0 | 28.8 | 100.0 |
| 1960 | 14.4 | 59.7 | 25.9 | 100.0 |
| 1961 | 13.8 | 67.4 | 18.8 | 100.0 |
| 1962 | 12.8 | 77.0 | 10.2 | 100.0 |
| 1963 | 11.8 | 76.0 | 12.2 | 100.0 |
| 1964 | 11.8 | 78.1 | 10.1 | 100.0 |
| 1965 | 11.1 | 77.0 | 11.9 | 100.0 |
| 1966 | 11.2 | 78.3 | 10.5 | 100.0 |
| 1967 | 10.9 | 82.1 | 7.0 | 100.0 |
| 1968 | 10.3 | 83.8 | 5.9 | 100.0 |
| 1969 | 10.6 | 88.8 | 0.6 | 100.0 |
| 1970 | 10.3 | 95.0 | – 5.3 | 100.0 |
| 1971 | 10.3 | 100.8 | – 11.1 | 100.0 |
| 1972 | 10.6 | 107.9 | – 18.5 | 100.0 |
| 1973 | 10.6 | 114.6 | – 25.2 | 100.0 |

¹ Consists of energy derived from wood and hydro-electricity.

² All percentages are calculated on the basis of heat content of domestically available fuels and electricity in the appropriate year. Negative figures indicate exports exceeding imports.

Source: Same as in Table 7.1.

TABLE 7.6. Average Heat Content Per Person of Domestically Available Energy by Fuel Type

| | Wood | Coal and its derivatives | Hydro- electricity | Petroleum fuels | Natural gas | Nuclear electricity |
|----------------|---------------------------------|-----------------------------|-----------------------|--------------------|-------------|------------------------|
| | millions of B.t.u.'s per person | | | | | |
| 1870 | 48.3 | 3.1 | – | 0.4 | – | – |
| 1880 | 51.7 | 12.7 | – | 0.5 | – | – |
| 1890 | 43.9 | 26.9 | 0.1 | 1.2 | – | – |
| 1900 | 35.1 | 40.5 | 0.3 | 0.8 | 0.5 | – |
| 1910 | 35.3 | 77.3 | 1.1 | 1.6 | 1.1 | – |
| 1920 | 21.7 | 99.9 | 2.3 | 5.9 | 2.0 | – |
| 1926 | 20.3 | 88.9 | 3.8 | 13.1 | 2.0 | – |
| 1929 | 20.2 | 91.6 | 6.1 | 22.4 | 2.8 | – |
| 1933 | 16.9 | 55.1 | 5.9 | 17.5 | 2.2 | – |
| 1939 | 18.7 | 69.5 | 8.6 | 26.5 | 3.1 | – |
| 1948 | 11.3 | 97.5 | 11.4 | 50.3 | 5.1 | – |
| 1952 | 8.4 | 77.5 | 14.1 | 70.2 | 6.9 | – |
| 1958 | 7.7 | 35.7 | 17.3 | 92.0 | 19.9 | – |
| 1960 | 6.2 | 29.9 | 19.2 | 101.9 | 25.8 | – |
| 1962 | 5.4 | 28.6 | 18.9 | 105.9 | 32.9 | – |
| 1964 | 4.6 | 30.8 | 19.9 | 116.0 | 38.3 | – |
| 1966 | 3.7 | 30.7 | 21.9 | 128.8 | 44.4 | – |
| 1968 | 3.0 | 31.4 | 22.3 | 138.6 | 50.8 | 0.1 |
| 1970 | 2.4 | 31.7 | 24.7 | 147.5 | 61.0 | 0.2 |
| 1972 | 2.1 | 28.1 | 26.8 | 156.2 | 71.4 | 1.1 |
| 1973 | 2.0 | 28.5 | 27.6 | 163.8 | 75.0 | 2.2 |

Source: Same as in Table 7.1.

TABLE 7.7. Balance of Trade in Energy by Average Heat Content Per Person and by Fuel Type

| | Coal and its derivatives | Petroleum fuels | Electricity | Natural gas |
|------------|---------------------------------|-----------------|-------------|-------------|
| | millions of B.t.u.'s per person | | | |
| 1870 | 1.9 | — | — | — |
| 1880 | — 4.2 | — | — | — |
| 1890 | — 11.3 | — 0.2 | — | — |
| 1900 | — 14.0 | — | — | — |
| 1910 | — 32.4 | — 1.3 | — | — |
| 1920 | — 51.8 | — 5.7 | — | — |
| 1926 | — 50.7 | — 12.9 | 0.5 | — |
| 1929 | — 50.5 | — 21.7 | 0.5 | — |
| 1933 | — 29.4 | — 16.9 | — | — |
| 1939 | — 33.0 | — 22.3 | 0.6 | — |
| 1948 | — 63.3 | — 45.4 | 0.4 | — |
| 1952 | — 45.3 | — 45.9 | 0.6 | 0.1 |
| 1958 | — 19.9 | — 34.9 | 0.8 | 3.6 |
| 1960 | — 16.7 | — 37.9 | 1.0 | 6.2 |
| 1962 | — 16.0 | — 23.0 | 0.2 | 19.2 |
| 1964 | — 18.4 | — 23.5 | 0.2 | 20.5 |
| 1966 | — 20.2 | — 23.6 | 0.2 | 19.5 |
| 1968 | — 20.2 | — 19.6 | — 0.1 | 25.3 |
| 1970 | — 18.2 | — 4.1 | 0.4 | 36.1 |
| 1972 | — 10.8 | 16.9 | 1.4 | 45.5 |
| 1973 | — 6.9 | 34.0 | 2.2 | 45.8 |

Source: Same as in Table 7.1.

TABLE 7.8. Consumption of Fuel and Electricity by Source of Supply

| | Directly from primary sources | From excess of imports over exports of secondary fuel and electricity | From domestic conversion and transformation of primary and secondary fuel and electricity | Total | Total heat content of fuel and electricity consumed ¹ |
|------------|-------------------------------|---|---|-------|--|
| | per cent | | | | 10 ¹² B.t.u.'s |
| 1926 | 85.0 | 4.1 | 10.9 | 100.0 | 1,143 |
| 1929 | 79.4 | 4.9 | 15.7 | 100.0 | 1,349 |
| 1933 | 76.3 | 3.0 | 20.7 | 100.0 | 987 |
| 1939 | 76.7 | 2.2 | 21.1 | 100.0 | 1,330 |
| 1948 | 70.5 | 5.6 | 23.9 | 100.0 | 2,027 |
| 1952 | 58.5 | 7.8 | 33.7 | 100.0 | 2,302 |
| 1958 | 42.8 | 5.7 | 51.5 | 100.0 | 2,747 |
| 1959 | 41.3 | 7.0 | 51.7 | 100.0 | 2,933 |
| 1960 | 40.9 | 6.3 | 52.8 | 100.0 | 2,998 |
| 1961 | 41.4 | 5.1 | 53.5 | 100.0 | 3,088 |
| 1962 | 40.7 | 4.6 | 54.7 | 100.0 | 3,258 |
| 1963 | 39.9 | 4.8 | 55.3 | 100.0 | 3,429 |
| 1964 | 39.9 | 6.3 | 53.8 | 100.0 | 3,652 |
| 1965 | 39.3 | 8.6 | 52.1 | 100.0 | 3,883 |
| 1966 | 39.7 | 8.4 | 51.9 | 100.0 | 4,074 |
| 1967 | 38.7 | 9.0 | 52.3 | 100.0 | 4,252 |
| 1968 | 38.0 | 9.1 | 52.9 | 100.0 | 4,518 |
| 1969 | 39.1 | 8.5 | 52.4 | 100.0 | 4,756 |
| 1970 | 38.5 | 7.7 | 53.8 | 100.0 | 5,061 |
| 1971 | 38.8 | 4.9 | 56.3 | 100.0 | 5,215 |
| 1972 | 39.1 | 2.0 | 58.9 | 100.0 | 5,518 |
| 1973 | 39.5 | 2 | 60.5 | 100.0 | 5,779 |

¹ For distinction between energy consumed and energy available domestically, see text.

² In 1973 exports of secondary fuels exceeded imports.

Source: Same as in Table 7.1.

TABLE 7.9. Relationship Between Economic Activity and Consumption of Energy

| | Real Domestic Product at factor cost | Heat content of domestically available fuel and electricity divided by Real Domestic Product at factor cost | Heat content of fuel and electricity consumed divided by Real Domestic Product at factor cost |
|------|--------------------------------------|---|---|
| | millions of 1961 dollars | thousands of B.t.u.'s per 1961 dollars | |
| 1939 | 12,421 | 114.7 | 107.1 |
| 1948 | 20,065 | 112.2 | 101.0 |
| 1952 | 25,656 | 99.8 | 89.7 |
| 1958 | 32,203 | 91.5 | 85.3 |
| 1959 | 33,866 | 94.8 | 86.6 |
| 1960 | 34,680 | 94.4 | 86.5 |
| 1961 | 35,388 | 95.9 | 87.3 |
| 1962 | 37,865 | 94.0 | 86.0 |
| 1963 | 40,059 | 95.0 | 85.6 |
| 1964 | 42,926 | 94.2 | 85.1 |
| 1965 | 46,004 | 94.2 | 84.4 |
| 1966 | 49,331 | 93.1 | 82.6 |
| 1967 | 50,994 | 92.9 | 83.4 |
| 1968 | 53,967 | 94.5 | 83.7 |
| 1969 | 57,187 | 93.4 | 83.2 |
| 1970 | 58,603 | 97.2 | 86.4 |
| 1971 | 62,071 | 95.0 | 84.0 |
| 1972 | 65,291 | 95.5 | 84.5 |
| 1973 | 69,785 | 94.7 | 82.8 |
| 1974 | 72,333 | 95.6 ^P | ... |

Source: Same as in Table 7.1.

TABLE 7.10. Percentage of Energy Consumed in Various Forms¹

| | 1870 | 1900 | 1926 | 1948 | 1958 | 1972 |
|---------------------------|------------------|-------------------|------------------|-------------------|-------|-------|
| | per cent | | | | | |
| Aviation gasoline | ... | ... | ... | ... | 0.7 | 0.1 |
| Aviation turbo fuel | ... | ... | ... | ... | 0.8 | 1.8 |
| Still gas | ... | ... | ... | 0.3 | 2.0 | 1.9 |
| Liquefied petroleum gases | ... | ... | ... | 0.2 | 0.6 | 1.3 |
| Coke oven gas | ... | ... | 1.4 | 1.8 | 0.9 | 0.7 |
| Coke | ... | ... | 4.1 | 2.5 | 3.2 | 2.6 |
| Petroleum coke | ... | ... | 0.1 | 0.1 | 0.7 | 0.3 |
| Motor gasoline | ... | ... | 4.0 ² | 10.9 ² | 17.7 | 17.8 |
| Electricity | ... | 0.3 | 3.2 | 7.7 | 11.6 | 14.3 |
| Natural gas | ... | 0.6 | 1.6 ³ | 3.1 | 11.1 | 25.6 |
| Light fuel oil | ... | ... | ... | ... | 11.1 | 11.9 |
| Heavy fuel oil | ... | ... | ... | ... | 11.1 | 12.3 |
| Diesel oil | ... | ... | 5.4 | 14.0 | 4.6 | 5.8 |
| Kerosene | 0.84 | 1.1 ⁴ | ... | ... | 3.6 | 1.9 |
| Coal and coal briquettes | 6.0 ⁵ | 52.5 ⁵ | 63.4 | 52.4 | 15.8 | 1.1 |
| Wood | 93.2 | 45.5 | 16.8 | 7.0 | 4.5 | 0.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

¹ Based on heat content of fuel or electricity actually consumed. For example, electric energy derived both from coal and hydro power is shown as electricity, with that derived from coal included on the basis of heat content of electricity generated, not on the basis of heat content of coal consumed in generation. Figures for 1870 and 1900 are actually the fractions of total available domestic heat content derived from the primary sources of wood, coal, crude oil, hydro power and natural gas and should be regarded as the limits set for the heat content of various possible derivatives.

² Includes naptha.

³ Includes manufactured gas.

⁴ Based on heat content of domestic supply of crude oil. However, it is known that all crude oil prior to about 1910 was refined into kerosene, with other distillates rejected. (See Davis Commission Report on Canadian Energy Prospects, 1957.)

⁵ A substantial portion of early use of coal involved production of coal oil and gas for street lighting. (See Davis Commission Report.)

Source: Catalogue 13-506, *Energy Services in Canada, Commodity Accounts for 1948 and 1952*, Reference Paper No. 69; Catalogue 13-507, *Energy Sources in Canada, Commodity Statements for 1926, 1929, 1933 and 1939*, Reference Paper No. 74; Catalogue 57-207, *Detailed Energy Supply and Demand in Canada, 1958-1969*; Urquhart and Buckley, eds., *Historical Statistics of Canada*, Toronto, MacMillan Company of Canada, 1965.

TABLE 7.11. Consumption of Energy in Various Sectors of the Economy by Fuel Type, 1973

| | Coal and its derivatives ¹ | Motor gasoline | Diesel fuel oil | Light fuel oil | Heavy fuel oil |
|-----------------------------------|---------------------------------------|--|-----------------|----------------|----------------|
| 10 ¹² B.t.u.'s | | | | | |
| Energy supply industry. | 0.4 | 1.1 | 2.6 | 0.8 | 102.8 |
| Transportation: | | | | | |
| Road | — | 1,048.8 | 71.4 | — | — |
| Rail | 1.3 | — | 79.1 | 6.0 | 7.9 |
| Air | — | — | — | — | — |
| Marine ² | 3.3 | — | 40.0 | 0.6 | 81.2 |
| Total | 4.6 | 1,048.8 | 190.5 | 6.6 | 89.1 |
| Domestic and farm | 7.8 | — | 41.3 | 437.4 | 20.5 |
| Commercial ³ | 1.5 | — | 23.7 | 97.1 | 142.5 |
| Industrial. | 235.0 | — | 101.3 | 84.8 | 316.5 |
| Losses and adjustments. | 24.4 | 15.5 | 4.0 | 5.9 | — 0.3 |
| Total | 273.7 | 1,065.4 | 363.4 | 632.6 | 671.1 |
| | Aviation gasoline and turbo fuel | Other petroleum derivatives ⁴ | Natural gas | Electricity | Total |
| 10 ¹² B.t.u.'s | | | | | |
| Energy supply industry. | 0.1 | 129.6 | 326.5 | 76.5 | 640.4 |
| Transportation: | | | | | |
| Road | — | — | — | — | 1,120.2 |
| Rail | — | 1.3 | — | — | 95.6 |
| Air | 119.9 | — | — | — | 119.9 |
| Marine ² | — | 0.3 | — | — | 125.4 |
| Total | 119.9 | 1.6 | — | — | 1,461.1 |
| Domestic and farm | — | 162.3 ⁵ | 271.8 | 184.3 | 1,125.4 |
| Commercial ³ | — | 13.5 | 255.2 | 210.7 | 744.2 |
| Industrial. | — | 21.5 | 527.6 | 379.1 | 1,665.8 |
| Losses and adjustments. | 0.6 | 5.1 | 87.0 | — | 142.2 |
| Total | 120.6 | 333.6 | 1,468.1 | 850.6 | 5,779.1 |

¹ Includes coal, coke and coke oven gas.

² Does not include Canadian Armed Forces' equipment.

³ Includes government.

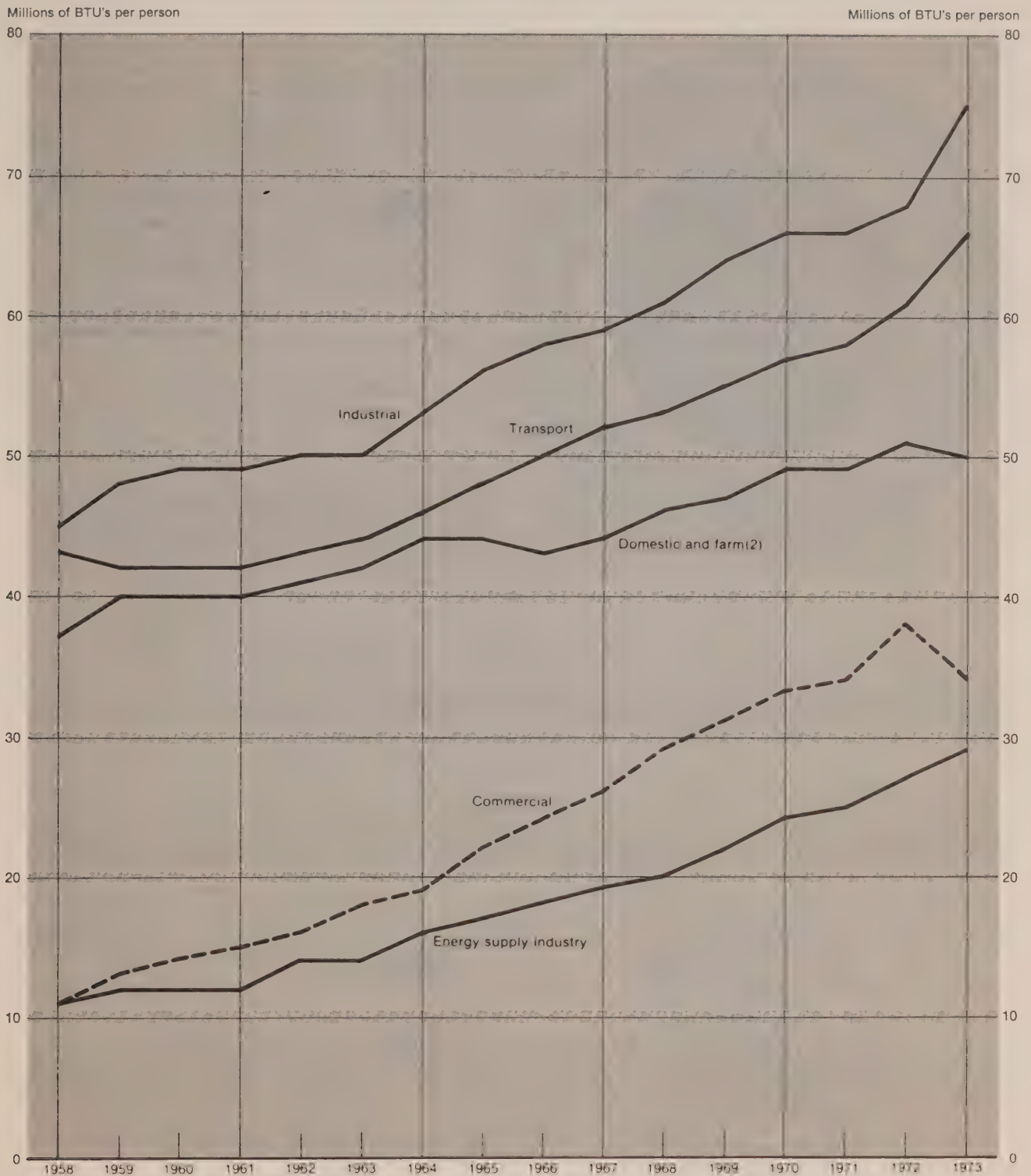
⁴ Includes liquified petroleum gases, crude oil, still gas, kerosene and petroleum coke.

⁵ Includes an estimate of 30.8 x 10¹² B.t.u.'s generated from wood.

Source: Catalogue 57-207, *Detailed Energy Supply and Demand in Canada* (1973).

Chart — 7.12

Average Consumption of Energy per Person by Sector (1) of the Economy



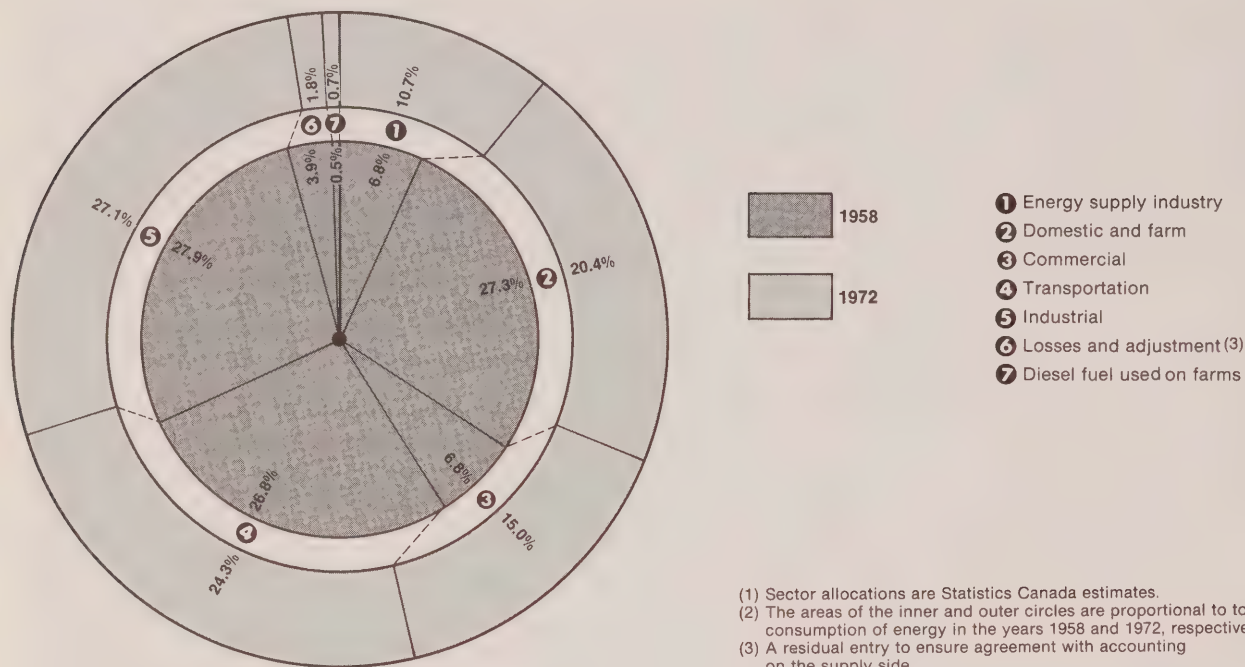
(1) Sector allocations are Statistics Canada estimates.

(2) Excludes diesel oil.

Source: Catalogue 57-207, DETAILED ENERGY SUPPLY AND DEMAND IN CANADA;
Catalogue 57-505, DETAILED ENERGY SUPPLY AND DEMAND IN CANADA, 1958-1969.

Chart — 7.13

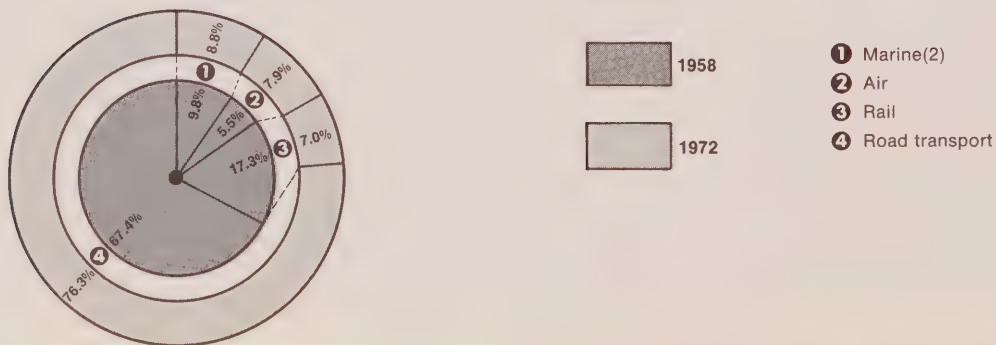
Percentage of Energy Consumed in Various Sectors⁽¹⁾ of the Economy, 1958 and 1972⁽²⁾



Source: Same as in chart 7.12.

Chart — 7.14

Percentage Distribution of Energy Consumed in the Transportation Sector by Mode of Transport, 1958 and 1972⁽¹⁾



Source: Same as in chart 7.12.

TABLE 7.15. Share Index of Energy Consumption Per Person by Type of Fuel, by Province, 1972¹

| | Coal and its derivatives ² | Motor gasoline | Diesel oil | Light fuel oil | Heavy fuel oil | |
|---|---------------------------------------|------------------------------------|-------------------|----------------|----------------|-------|
| Atlantic provinces. | 0.83 | 0.89 | 1.37 | 1.61 | 1.76 | |
| Quebec. | 0.32 | 0.86 | 0.65 | 1.32 | 1.62 | |
| Ontario. | 2.08 | 1.03 | 0.63 | 1.03 | 0.79 | |
| Manitoba. | 0.59 | 1.02 | 1.48 | 0.36 | 0.24 | |
| Saskatchewan | 0.23 | 1.37 | 1.85 | 0.35 | 0.18 | |
| Alberta. | 0.24 | 1.30 | 1.71 | 0.11 | 0.15 | |
| British Columbia, Yukon and Northwest Territories | 0.31 | 0.99 | 1.77 | 0.68 | 0.65 | |
| Total consumption | 11.4 | 45.0 | 14.7 | 30.2 | 31.1 | |
| | Aviation gasoline and turbo fuel | Other petroleum fuels ³ | Wood ⁴ | Natural gas | Electricity | Total |
| Atlantic provinces. | 1.17 | 1.91 | 2.56 | — | 0.70 | 0.92 |
| Quebec. | 1.05 | 1.00 | 1.47 | 0.15 | 1.19 | 0.85 |
| Ontario. | 0.74 | 0.60 | 0.39 | 1.06 | 0.95 | 0.99 |
| Manitoba. | 1.21 | 1.46 | 0.81 | 1.18 | 0.95 | 0.91 |
| Saskatchewan | 0.45 | 0.54 | 0.71 | 2.07 | 0.65 | 1.09 |
| Alberta. | 1.41 | 1.92 | 0.39 | 4.18 | 0.70 | 1.67 |
| British Columbia, Yukon and Northwest Territories | 1.44 | 0.86 | 1.05 | 1.16 | 1.32 | 1.02 |
| Total consumption | 4.9 | 12.8 | 1.5 | 65.0 | 36.2 | 252.8 |

¹ Includes consumption in all sectors of the economy. The breakdown into various energy types is done as close to the final step in consumption as they can be traced; electricity derived from all sources is shown as simple heat equivalent of electricity generated. The relative share is based on the average for Canada: thus if 20% of all Canadians were located in a certain province in which 30% of all diesel oil were consumed, the corresponding index would be 1.5: thus a number greater than 1 indicates relatively heavy use of energy.

² Includes coal, coke and coke oven gas.

³ Includes crude oil, still gas, kerosene and petroleum coke.

⁴ Wood equivalent to 32.7×10^{12} B.t.u.'s of heat was estimated to have been consumed in residential use in Canada in 1972 and was apportioned among the various provinces on the basis of the number of households using wood as principal heating fuel in the respective provinces.

Source: Catalogue 57-207, *Detailed Energy Supply and Demand in Canada* (1972); Catalogue 64-202, *Household Facilities and Equipment* (1972).

**TABLE 7.16. Share Index of Consumption of Energy Per Person by Sector¹
of the Economy, by Province, 1972²**

| | Energy supply industry ³ | Transport | | | | |
|---|---|---------------------------------|------------|------------|---|--------------------|
| | | Road | Rail | Air | Marine ⁴ | |
| Atlantic provinces. | 0.57 | 0.87 | 1.18 | 1.16 | 4.04 | |
| Quebec. | 0.61 | 0.86 | 0.78 | 1.05 | 1.22 | |
| Ontario. | 0.54 | 1.03 | 0.64 | 0.74 | 0.45 | |
| Manitoba. | 0.86 | 1.02 | 2.45 | 1.20 | 0.05 | |
| Saskatchewan | 1.65 | 1.37 | 1.22 | 0.45 | 0.03 | |
| Alberta. | 4.43 | 1.32 | 2.15 | 1.41 | 0.06 | |
| British Columbia, Yukon and Northwest Territories | 1.31 | 1.01 | 1.10 | 1.44 | 1.02 | |
| | millions of B.t.u.'s per person | | | | | |
| Total consumption | 27.0 | 46.9 | 4.3 | 4.8 | 5.4 | |
| | Domestic and farm ⁵ | Diesel fuel used on farms | Commercial | Industrial | Losses and adjust- ments ⁶ | Total ⁷ |
| Atlantic provinces. | 1.20 | 0.60 | 0.80 | 0.66 | 1.06 | 0.92 |
| Quebec. | 0.94 | 0.24 | 0.97 | 0.82 | 0.35 | 0.85 |
| Ontario. | 0.98 | 0.45 | 1.04 | 1.26 | 0.38 | 0.99 |
| Manitoba. | 1.03 | 2.80 | 1.02 | 0.61 | 0.70 | 0.91 |
| Saskatchewan | 1.03 | 7.34 | 0.67 | 0.79 | 2.98 | 1.09 |
| Alberta. | 1.20 | 3.08 | 1.67 | 1.00 | 5.63 | 1.67 |
| British Columbia, Yukon and Northwest Territories | 0.89 | 0.50 | 0.75 | 1.16 | 0.77 | 1.02 |
| | millions of B.t.u.'s per person | | | | | |
| Total consumption | 51.6 | 1.7 | 38.0 | 68.4 | 4.7 | 252.8 |

¹ Since data are submitted to Statistics Canada by the energy supply industries on a non-coordinated basis the sector allocations are estimates only.

² For a definition of share index see Table 7.15.

³ Includes transportation of energy products, for example, by pipeline and power line losses.

⁴ Excludes Canadian Armed Forces' equipment.

⁵ Excludes diesel fuel consumption.

⁶ The same definition of share index applies to this column as for other columns, expressing losses and adjustments for all fuels consumed in a province as a fraction of the same quantity computed Canada-wide.

⁷ Excludes non-energy use of various potential fuels, such as lubricants.

Source: Catalogue 57-207, *Detailed Energy Supply and Demand in Canada* (1972).

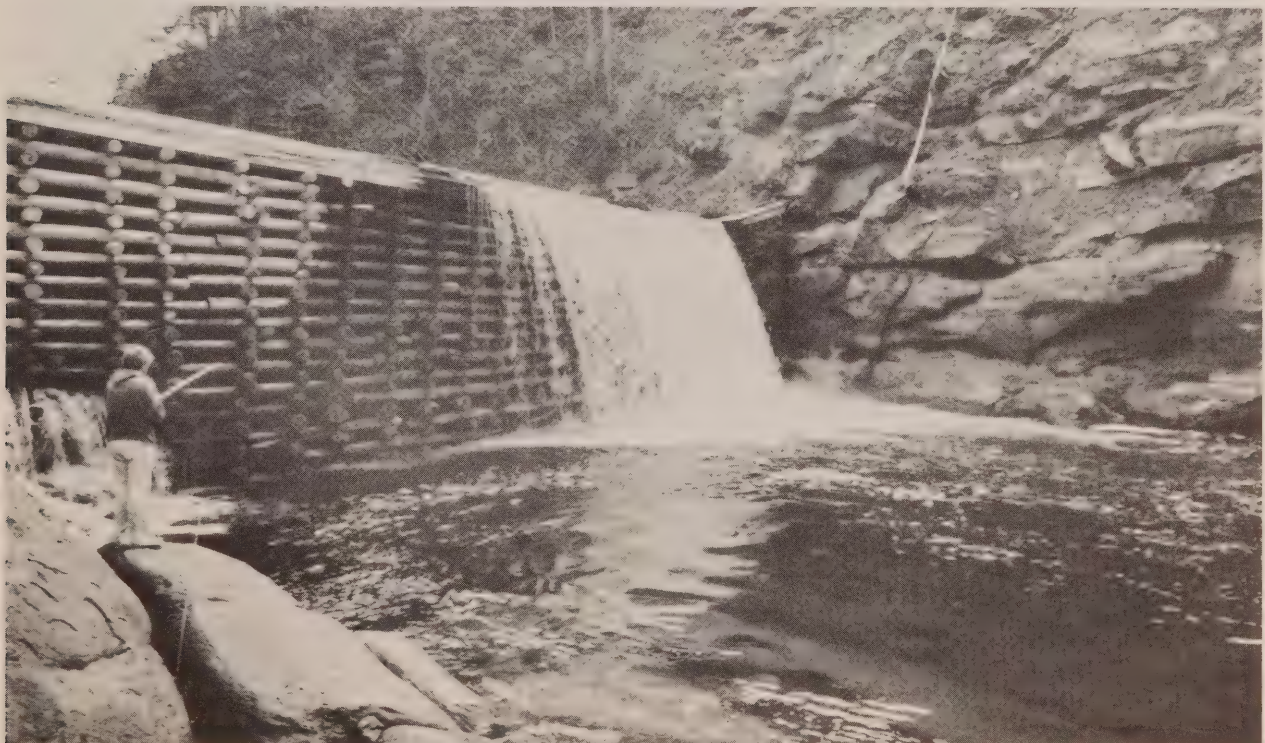
TABLE 7.17. Total Energy Consumption¹ by Province

| | Total energy consumed | | | Average total energy consumed per person | | |
|---|---------------------------|-------|-------|--|------|------|
| | 1958 | 1964 | 1973 | 1958 | 1964 | 1973 |
| | 10 ¹² B.t.u.'s | | | millions of B.t.u.'s per person | | |
| Atlantic provinces | 237 | 309 | 497 | 131 | 158 | 236 |
| Quebec | 674 | 903 | 1,391 | 137 | 162 | 229 |
| Ontario | 993 | 1,336 | 2,020 | 171 | 202 | 254 |
| Manitoba | 296 ² | 156 | 231 | 167 ² | 163 | 232 |
| Saskatchewan | | 195 | 252 | | 207 | 277 |
| Alberta | 307 | 418 | 758 | 255 | 293 | 450 |
| British Columbia, Yukon and Northwest Territories | 240 | 335 | 630 | 153 | 187 | 266 |
| Canada | 2,747 | 3,652 | 5,779 | 161 | 189 | 262 |

¹ Also referred to as final energy consumption.

² No separate figures available for Saskatchewan and Manitoba.

Source: Catalogue 57-207, *Detailed Energy Supply and Demand in Canada*; Catalogue 57-505, *Detailed Energy Supply and Demand in Canada, 1958-1969*; unpublished data, Energy and Minerals Section, Statistics Canada.



Sawmill dam, Fundy National Park, New Brunswick (photo by Bruce Mitchell)

Chart — 7.18

Monthly Net Sales of Electricity and Selected Fuels

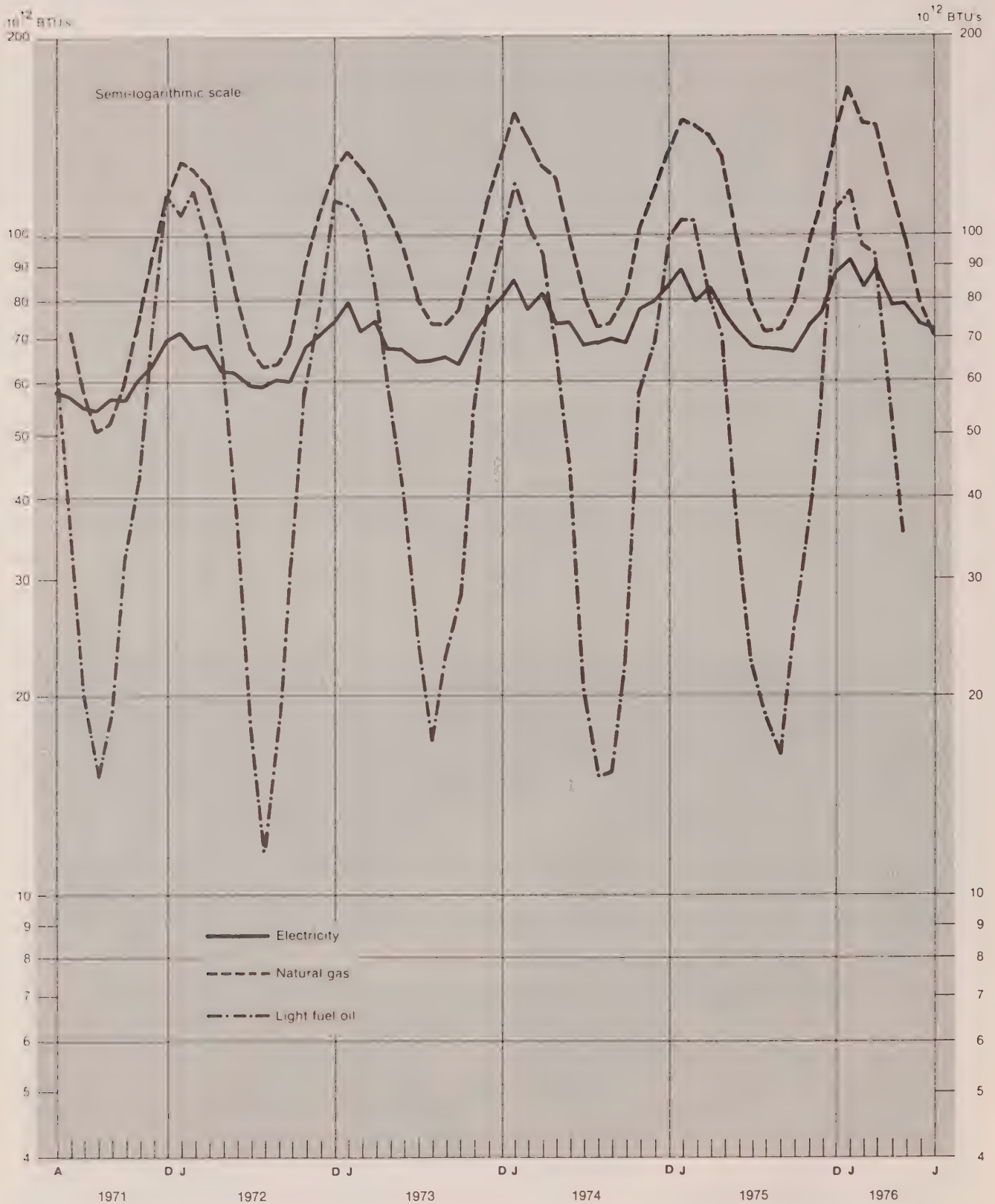
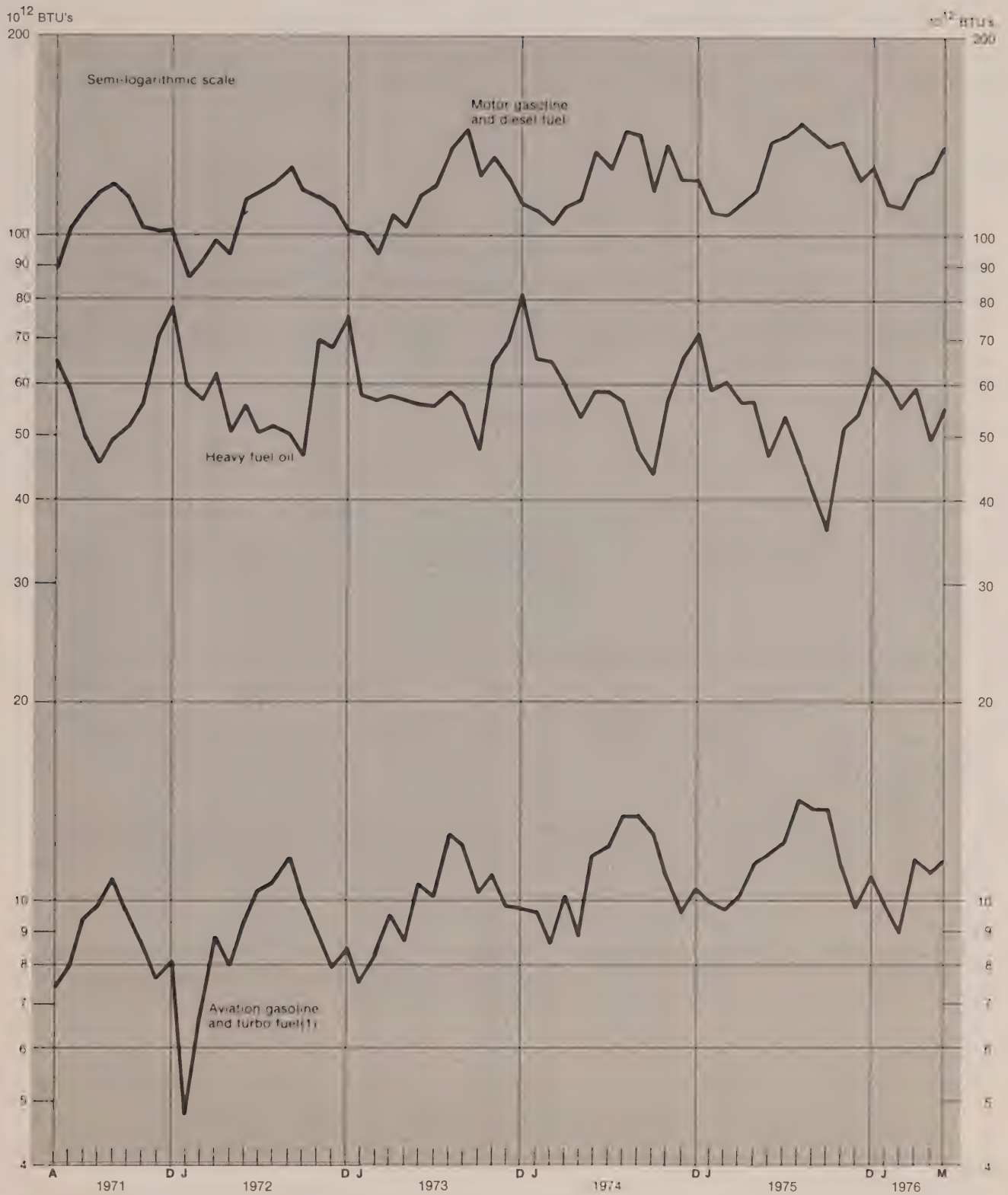


Chart — 7.19

Monthly Net Sales of Selected Fuels



(1) The average weighted conversion factor of 5,389 million BTU's per barrel of 35 Canadian gallons is used in the conversion.

Source: Same as in Table 7.18.

TABLE 7.20. Energy Consumed in the Manufacturing Industries

| Industrial group ² | Heat content consumed by type of energy used ¹ | | | | | |
|---|--|---------|------------------------------------|-----------|--|---------|
| | Coal and its derivatives | | Petroleum products | | Natural gas | |
| | 1962 | 1972 | 1962 | 1972 | 1962 | 1972 |
| | billions of B.t.u.'s | | | | | |
| | | | | | | |
| Paper and allied | 56,772 | 12,197 | 59,903 | 163,304 | 25,255 | 68,438 |
| Primary metal | 28,856 | 26,952 | 39,512 | 54,163 | 22,953 | 68,281 |
| Chemical and chemical products | 26,459 | 938 | 11,741 | 42,323 | 24,474 | 61,341 |
| Non-metallic products | 22,632 | 5,883 | 23,256 | 44,902 | 24,192 | 57,148 |
| Food and beverage | 12,550 | 294 | 32,823 | 47,261 | 17,860 | 39,711 |
| Transportation and equipment | 10,256 | 3,671 | 4,767 | 12,613 | 2,143 | 14,409 |
| Textile | 5,226 | 91 | 10,552 | 18,432 | 1,157 | 6,437 |
| Wood | 544 | 145 | 5,017 | 12,814 | 1,011 | 8,620 |
| Petroleum and coal products | 25 | 26 | 346 | 882 | 7,727 | 16,569 |
| Metal fabricating | 1,461 | 26 | 4,369 | 7,152 | 3,984 | 14,097 |
| Rubber and plastics products | 3,573 | 47 | 1,269 | 7,572 | 387 | 4,376 |
| Electrical products | 2,555 | 355 | 4,484 | 4,969 | 1,251 | 5,619 |
| Machinery (except electrical machinery) | 1,600 | 276 | 2,258 | 3,271 | 1,414 | 5,562 |
| Miscellaneous manufacturing | 1,145 | 63 | 1,589 | 3,286 | 508 | 2,196 |
| Printing, publishing and allied | 311 | — | 1,620 | 1,740 | 401 | 1,766 |
| Furniture and fixture | 628 | 184 | 713 | 1,722 | 221 | 1,542 |
| Knitting mills | 853 | — | 788 | 1,833 | 67 | 737 |
| Leather | 1,250 | 2 | 654 | 1,199 | 110 | 689 |
| Clothing | 212 | 2 | 627 | 818 | 92 | 717 |
| Tobacco products | 135 | 3 | 840 | 714 | 125 | 334 |
| Total manufacturing | 177,043 | 51,155 | 207,128 | 430,970 | 135,332 | 378,589 |
| | Heat content consumed by type of energy used ¹ | | Total energy consumed ⁵ | | Average annual compound rate of growth of consumption of energy 1962 - 72 | |
| | Electricity ³ and other ⁴ | | | | | |
| | 1962 | 1972 | 1962 | 1972 | | |
| | billions of B.t.u.'s | | | | per cent | |
| | | | | | | |
| Paper and allied | 66,790 | 94,865 | 208,720 | 338,804 | 5.0 | |
| Primary metal | 72,630 | 107,299 | 163,951 | 256,695 | 4.6 | |
| Chemical and chemical products | 20,010 | 29,331 | 82,684 | 133,933 | 5.0 | |
| Non-metallic products | 7,960 | 12,125 | 78,040 | 120,058 | 4.4 | |
| Food and beverage | 5,723 | 10,786 | 68,956 | 98,052 | 3.6 | |
| Transportation and equipment | 2,865 | 8,357 | 20,031 | 39,050 | 6.9 | |
| Textile | 3,012 | 5,405 | 19,947 | 30,365 | 4.2 | |
| Wood | 2,966 | 7,347 | 9,538 | 28,926 | 11.8 | |
| Petroleum and coal products | 4,265 | 8,453 | 12,363 | 25,930 | 7.6 | |
| Metal fabricating | 1,869 | 4,639 | 11,683 | 25,914 | 8.2 | |
| Rubber and plastics products | 1,117 | 3,746 | 6,346 | 15,741 | 9.5 | |
| Electrical products | 2,311 | 3,845 | 10,601 | 14,788 | 3.4 | |
| Machinery (except electrical machinery) | 930 | 2,407 | 6,202 | 11,516 | 6.4 | |
| Miscellaneous manufacturing | 760 | 1,492 | 4,002 | 7,037 | 5.8 | |
| Printing, publishing and allied | 753 | 1,766 | 3,085 | 5,272 | 5.5 | |
| Furniture and fixture | 284 | 825 | 1,846 | 4,273 | 8.7 | |
| Knitting mills | 196 | 464 | 1,904 | 3,034 | 4.7 | |
| Leather | 234 | 376 | 2,248 | 2,266 | 0.1 | |
| Clothing | 190 | 668 | 1,121 | 2,205 | 7.0 | |
| Tobacco products | 200 | 409 | 1,300 | 1,460 | 1.2 | |
| Total manufacturing | 195,065 | 304,605 | 714,568 | 1,165,319 | 5.1 | |

¹ Calculated on the basis of simple heat equivalence contributed by each fuel and by electricity to total.

² Listed in descending order of total energy consumed in 1972. The 20 major industrial groups include all manufacturing industries.

³ Includes electricity purchased and also electricity generated by hydro power for own use, but does not include electricity generated from fossil fuels for own use. This latter is included with the appropriate types of fossil fuel shown, with heat content calculated as that of the fuel consumed in generation. The electricity generated by hydro power is estimated for 1962.

⁴ Includes wood, steam, other manufactured gas and all fuel types used by those smaller establishments which are not required to give breakdowns. The heat content in this category was estimated on the basis of cost incurred by it, the conversion factor being the average cost of energy for all other types of fuel purchased in the appropriate year. The heat contents in this category do not exceed 0.01% of the total energy consumed in any of the industrial groups.

⁵ Includes electricity thermally generated and sold to others, but assumed to be less than 0.1% of all electricity consumed in the entire manufacturing industry.

Source: Catalogue 57-002, *Energy Statistics*, VIII (46) and X (7); unpublished data from the Energy and Minerals Section, Statistics Canada.

TABLE 7.21. Energy Consumed in the Mineral Industries

| | Heat content consumed by type of energy used ¹ | | | | | |
|---|--|----------------------|------------------------------------|----------------|---|----------------|
| | Coal and its derivatives | | Petroleum products | | Natural gas | |
| | 1962 | 1972 | 1962 | 1972 | 1962 | 1972 |
| | billions of B.t.u.'s | | | | | |
| Metal mines: | | | | | | |
| Placer gold and gold quartz | 250 | 9 | 749 | 558 | 226 | 616 |
| Iron | 129 | 41 | 5,951 | 20,894 | — | 9,019 |
| Other | 2,656 | 1,105 | 4,659 | 12,645 | 460 | 3,489 |
| Non-metal mines: | | | | | | |
| Asbestos | 118 | 89 | 3,853 | 7,553 | 247 | — |
| Other | 943 | 250 | 2,695 | 3,003 | 1,775 | 18,992 |
| Mineral fuels: | | | | | | |
| Coal | 2,009 | 472 | 373 | 2,037 | — | 3,153 |
| Petroleum and natural gas | — | — | 5,956 | 6,353 | 55,718 | 185,027 |
| Structural materials: | | | | | | |
| Sand and gravel | 4 | — | 1,651 | 1,670 | 255 | 11 |
| Stone | 772 | 2 | 941 | 1,640 | 8 | 29 |
| Total mineral industries | 6,881 | 1,968 | 26,828 | 56,353 | 58,689 | 220,336 |
| | Heat content consumed by type of energy used ¹ | | Total energy consumed ⁴ | | Average annual compound rate of growth of consumption of energy, 1962 - 72 | |
| | Electricity ² and other ³ | | | | | |
| | 1962 | 1972 | 1962 | 1972 | | |
| | | billions of B.t.u.'s | | | | per cent |
| Metal mines: | | | | | | |
| Placer gold and gold quartz | 3,488 | 1,752 | 4,713 | 2,935 | — 4.6 | |
| Iron | 2,507 | 10,855 | 8,587 | 40,809 | 16.9 | |
| Other | 7,063 | 17,309 | 14,838 | 34,548 | 8.8 | |
| Non-metal mines: | | | | | | |
| Asbestos | 1,665 | 2,296 | 5,883 | 9,938 | 5.4 | |
| Other | 370 | 2,778 | 5,783 | 25,023 | 15.8 | |
| Mineral fuels: | | | | | | |
| Coal | 704 | 1,487 | 3,086 | 7,149 | 8.7 | |
| Petroleum and natural gas | 2,370 | 7,147 | 64,044 | 198,527 | 12.0 | |
| Structural materials: | | | | | | |
| Sand and gravel | 101 | 156 | 2,011 | 1,837 | — 0.9 | |
| Stone | 347 | 387 | 2,068 | 2,058 | — 0.1 | |
| Total mineral industries | 18,615 | 44,167 | 111,013 | 322,824 | 11.3 | |

¹ Calculated on the basis of simple heat equivalence contributed by each fuel type and electricity to total.

² Does not include electricity generated from fossil fuels for own use. For 1962, the amount of electricity generated for own use that is generated by hydro power is estimated to be the same fraction as the known proportion for 1972.

³ Includes wood and steam for 1972, as well as other fuels unspecified, whose heat content was estimated from expenditure data on the basis of average purchase price of energy in the entire minerals industry for the appropriate year. The fraction of energy not specifically identified as electricity amounts to about 4% for 1962 and about 0.7% for 1972 for the entire minerals industry.

⁴ For metal mines, this includes electricity generated from fossil fuels and sold to others, but this is assumed to be less than 0.1% of all electricity consumed in the entire metal mines industry.

Source: Catalogue 26-201, *General Review of the Mineral Industries* (1962 and 1972); Catalogue 26-213 *The Crude Petroleum and Natural Gas Industry* (1965 and 1972); Catalogue 26-201, *The Coal Mining Industry* (1962 and 1972); unpublished data from the Energy and Minerals Section, Statistics Canada.

TABLE 7.22. Energy Intensities in the Manufacturing Industries

| Industrial group ¹ | Ratio of energy consumed to Real Domestic Product | | Energy consumed per employee | |
|---|--|------|------------------------------------|------|
| | 1962 | 1972 | 1962 | 1972 |
| | thousands of B.t.u.'s per 1961 dollar | | billions of B.t.u.'s per person | |
| Paper and allied | 218 | 232 | 2.07 | 2.80 |
| Primary metal | 198 | 186 | 1.78 | 2.25 |
| Chemical and chemical products | 122 | 198 | 1.29 | 1.79 |
| Non-metallic mineral products | 217 | 217 | 1.73 | 2.27 |
| Food and beverage | 51 | 48 | 0.33 | 0.45 |
| Transportation equipment | 24 | 16 | 0.19 | 0.25 |
| Textile | 55 | 46 | 0.29 | 0.41 |
| Wood | 22 | 40 | 0.11 | 0.28 |
| Petroleum and coal products | 44 | 53 | 0.77 | 1.73 |
| Metal fabricating | 16 | 20 | 0.11 | 0.18 |
| Rubber and plastics products | 33 | 53 | 0.28 | 0.32 |
| Electrical products | 16 | 12 | 0.11 | 0.12 |
| Machinery (except electrical machinery) | 16 | 14 | 0.08 | 0.15 |
| Miscellaneous manufacturing | 12 | 10 | 0.07 | 0.12 |
| Printing, publishing and allied | 6 | 8 | 0.04 | 0.06 |
| Furniture and fixture | 11 | 13 | 0.05 | 0.09 |
| Knitting mills | 22 | 19 | 0.08 | 0.12 |
| Leather | 20 | 22 | 0.07 | 0.08 |
| Clothing | 4 | 5 | 0.01 | 0.02 |
| Tobacco products | 16 | 14 | 0.12 | 0.15 |
| Total manufacturing | 74 | 67 | 0.53 | 0.70 |

¹ Listed in descending order of total energy consumed in 1972.

Source: Catalogue 31-203, *Manufacturing Industries of Canada, National and Provincial Areas* (1962 and 1972); unpublished data from the Industry Product Division, Statistics Canada.

TABLE 7.23. Energy Intensities in the Mineral Industries

| | Ratio of energy consumed to Real Domestic Product | | Energy consumed per employee ¹ | |
|---------------------------------------|--|------|--|-------|
| | 1962 | 1972 | 1962 | 1972 |
| | thousands of B.t.u.'s per 1961 dollar | | billions of B.t.u.'s per person | |
| Metal mines: | | | | |
| Placer gold and gold quartz | 44 | 52 | 0.31 | 0.53 |
| Iron | 59 | 140 | 0.94 | 3.76 |
| Other | 23 | 38 | 0.44 | 0.76 |
| Non-metal mines: | | | | |
| Asbestos | 57 | 68 | 0.85 | 1.27 |
| Other | 136 | 180 | 1.29 | 3.56 |
| Mineral fuels: | | | | |
| Coal | 45 | 50 | 0.31 | 0.82 |
| Petroleum and natural gas | 142 | 161 | 5.70 | 11.96 |
| Structural materials: | | | | |
| Sand and gravel | 2 | 2 | 0.84 | 0.78 |
| Stone | 2 | 2 | 0.64 | 0.73 |
| Total mineral industries | 65 | 104 | 1.15 | 3.01 |

¹ Includes employees employed in all activities of establishments involved.

² Not separately calculated but included in totals where applicable.

Source: Catalogue 26-601, *General Review of the Mineral Industries* (1964, 1965 and 1972); unpublished data from the Industry Product Division, Statistics Canada.

TABLE 7.24. Relative Share Indexes¹ of Average Consumption of Energy Per Employee and Per Value of Output² in the Manufacturing Industries, by Province

| | Relative share index of energy per employee | | | Relative share index of energy per dollar of output | | |
|--------------------------------|---|------|------|---|------|------|
| | 1953 | 1961 | 1971 | 1953 | 1961 | 1971 |
| Newfoundland | 1.94 | 2.11 | 1.83 | 2.14 | 2.38 | 2.42 |
| Prince Edward Island | 0.32 | 0.32 | 0.36 | 0.59 | 0.50 | 0.53 |
| Nova Scotia | 1.30 | 0.83 | 1.16 | 1.96 | 1.13 | 1.69 |
| New Brunswick | 1.63 | 1.90 | 1.96 | 1.99 | 2.18 | 1.68 |
| Quebec | 0.98 | 0.95 | 0.96 | 1.08 | 1.05 | 1.08 |
| Ontario | 0.93 | 0.86 | 0.82 | 0.86 | 0.81 | 0.75 |
| Manitoba | 0.78 | 0.82 | 0.79 | 0.89 | 0.94 | 0.98 |
| Saskatchewan | 1.75 | 1.33 | 1.40 | 1.53 | 1.24 | 1.33 |
| Alberta | 1.64 | 2.16 | 1.89 | 1.63 | 1.95 | 1.78 |
| British Columbia | 0.99 | 1.35 | 1.63 | 0.91 | 1.27 | 1.57 |
| Canada | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

¹ For the definition of relative share index see Table 5.15.

² Output defined in terms of value added.

Source: Same as in Table 7.20.

TABLE 7.25. Energy Consumption, Employment and Real Domestic Product in the Manufacturing Industry

| | 1953 | 1961 | 1971 |
|--|--------------------|-------|--------|
| Total employment | 1,399 ¹ | 1,353 | 1,628 |
| Total energy consumed in manufacturing (10 ¹² B.t.u.'s) | 649 | 766 | 1,136 |
| Real Domestic Product originating in manufacturing (millions of 1961 dollars) | 6,761 | 8,827 | 16,180 |
| Average energy consumed per employee (millions of B.t.u.'s per person) | 464 | 566 | 698 |
| Average energy consumed per dollar of Real Domestic Product originating in manufacturing (thousands of B.t.u.'s per 1961 dollar) | 96 | 87 | 70 |
| Average value of Real Domestic Product per employee (1961 dollars per person) | 4,833 | 6,526 | 9,936 |

¹ Estimated.

Source: Unpublished data from Input-Output Division, Statistics Canada; Catalogue 31-201, *General Review of the Manufacturing Industries of Canada*; (1953, 1961, 1969 and 1971); unpublished data from the Primary Industries Division, Energy and Minerals Section, Statistics Canada.

TABLE 7.26. Potential Heat Content of Fuel and Electricity Lost in Conversion and Transformation Processes¹ and in Consumption by the Energy Supply Industry²

| | Percentage of total potential heat content of domestically available energy | | |
|----------------|---|------------------------------------|--|
| | Lost in transformation and conversion ³ | Consumed by energy supply industry | Consumed outside of energy supply industry |
| 1958 | 7.4 | 6.3 | 86.3 |
| 1959 | 8.2 | 6.4 | 85.4 |
| 1960 | 8.5 | 6.6 | 84.9 |
| 1961 | 8.5 | 6.7 | 84.8 |
| 1962 | 8.8 | 7.1 | 84.1 |
| 1963 | 9.5 | 7.3 | 83.2 |
| 1964 | 9.9 | 7.5 | 82.6 |
| 1965 | 10.4 | 7.7 | 81.9 |
| 1966 | 10.8 | 7.9 | 81.3 |
| 1967 | 10.8 | 8.1 | 81.1 |
| 1968 | 11.0 | 8.3 | 80.7 |
| 1969 | 11.1 | 8.5 | 80.4 |
| 1970 | 11.2 | 8.9 | 79.9 |
| 1971 | 11.4 | 9.2 | 79.4 |
| 1972 | 11.7 | 9.4 | 78.9 |
| 1973 | 12.2 | 9.6 | 78.2 |

¹ See text for definitions.

² All series of percentages are smoothed by applying three-year moving averages according to the formula $(f(t-1) + 2f(t) + f(t+1))/4$.

³ Not all reduction in heat content of the energy stream at this stage can be properly regarded as "loss" in the absolute sense. Much of the primary hydrocarbons under refining is diverted to become raw materials for the chemical industry. A great deal also goes into the production of lubricants. In 1973, out of some 616 million barrels of crude oil available domestically, approximately 41 million barrels of non-energy hydrocarbons were produced. See also "Source of Data" and *Detailed Energy Supply and Demand in Canada* for further comments on non-energy use of fuels.

Source: Same as in Chart 7.12.

TABLE 7.27. Average Efficiency of Conversion of Fossil Fuels Into Electricity, by Utilities and by Fuel Type

| Fuel type | Efficiency of conversion ¹ | | | | | |
|-----------------------------------|---------------------------------------|-------------|-------------|-------------|-------------|-------------|
| | 1956 | 1957 | 1958 | 1972 | 1973 | 1974 |
| | per cent | | | | | |
| Coal: | | | | | | |
| Canadian bituminous | 21.7 | 22.3 | 22.5 | 25.6 | 25.8 | 24.8 |
| Imported bituminous | 27.6 | 27.9 | 26.2 | 36.1 | 34.7 | 36.1 |
| Sub-bituminous | 19.9 | 21.8 | 22.7 | 30.7 | 30.7 | 31.4 |
| Saskatchewan lignite | 21.0 | 19.2 | 20.1 | 26.9 | 27.6 | 26.7 |
| Other | 37.8 | 34.8 | 18.6 | ... | ... | ... |
| Heavy fuel oil | 21.0 | 23.0 | 22.3 | 25.7 | 28.3 | 26.7 |
| Diesel fuel oil | 28.6 | 31.2 | 29.0 | 27.8 | 27.4 | 28.9 |
| Natural gas | 24.2 | 24.3 | 23.3 | 27.8 | 28.7 | 27.6 |
| Other fuels, n.e.s. | 26.8 | 23.5 | ... | 7.7 | 5.1 | .. |
| All fossil fuels | 23.9 | 24.3 | 23.1 | 31.1 | 30.5 | 30.7 |

¹ Defined as the simple heat equivalent of electricity generated expressed as a percentage of heat equivalent of fossil fuel used in generation.

Source: Catalogue 57-202, *Electric Power Statistics* (II); Catalogue 57-002, *Energy Statistics*, Service Bulletin (November 1975); unpublished data from the Energy and Minerals Section, Statistics Canada.

TABLE 7.28. Average Efficiency of Conversion of Fossil Fuels Into Electricity, by Industries and Utilities¹

| | Heat equivalent of fossil fuel converted ² | Efficiency of conversion |
|----------------|---|--------------------------|
| | 10 ¹² B.t.u.'s | per cent |
| 1958 | 97.9 | 23.1 |
| 1960 | 119.0 | 23.3 |
| 1962 | 171.6 | 25.9 |
| 1964 | 253.7 | 28.3 |
| 1966 | 336.6 | 28.2 |
| 1968 | 469.0 | 29.0 |
| 1970 | 528.6 | 29.8 |
| 1972 | 600.4 | 29.9 |
| 1974 | 628.1 | 29.6 |

¹ Establishments surveyed include both utilities and industrial generators of electricity with capacity of at least 500 kilowatts.

² Excludes heat derived for generation of electricity from wood, pitch, petroleum, coke and fuels unspecified. This amounted to about 16.4 x 10¹² B.t.u.'s of heat converted in 1974.

Source: Catalogue 57-207, *Detailed Energy Supply and Demand, 1958-1972*; Catalogue 57-002, *Energy Statistics*, Service Bulletin (November 1975).

TABLE 7.29. Net Electrical Generating Capability, by Type and by Province

| | Hydro | | Fossil fuel | | Nuclear | | Total ¹ | | Average annual compound rate of growth, 1954 - 74 |
|---------------------------------|------------------------|--------|-------------|--------|---------|-------|--------------------|--------|---|
| | 1954 | 1974 | 1954 | 1974 | 1954 | 1974 | 1954 | 1974 | |
| | thousands of kilowatts | | | | | | | | per cent |
| Newfoundland | 207 | 5,919 | 16 | 392 | — | — | 223 | 6,311 | 18.2 |
| Prince Edward Island | — | — | 18 | 114 | — | — | 18 | 114 | 9.6 |
| Nova Scotia | 130 | 159 | 188 | 995 | — | — | 318 | 1,154 | 6.7 |
| New Brunswick | 112 | 683 | 132 | 642 | — | — | 244 | 1,325 | 8.8 |
| Quebec | 5,378 | 13,793 | 35 | 704 | — | — | 5,413 | 14,497 | 5.1 |
| Ontario | 3,481 | 6,855 | 607 | 6,634 | — | 1,775 | 4,088 | 15,264 | 6.8 |
| Manitoba | 522 | 2,209 | 46 | 461 | — | — | 568 | 2,670 | 8.0 |
| Saskatchewan | 85 | 582 | 243 | 1,131 | — | — | 328 | 1,713 | 8.6 |
| Alberta | 202 | 801 | 194 | 2,612 | — | — | 396 | 3,413 | 11.4 |
| British Columbia | 1,578 | 5,561 | 130 | 1,472 | — | — | 1,708 | 7,033 | 7.4 |
| Yukon | 24 ² | 27 | — | 38 | — | — | 24 ² | 65 | 9.5 ² |
| Northwest Territories | — | 35 | — | 48 | — | — | — | 83 | — |
| Canada | 11,719 | 36,624 | 1,609 | 15,243 | — | 1,775 | 13,328 | 53,642 | 7.2 |

¹ Because of the gradually extended coverage of establishments surveyed, the figures for 1954 and 1974 include establishments producing about 93% and 98.8% of all electricity generated for these years, respectively.

² No separate data available for the Yukon and Northwest Territories.

Source: Catalogue 57-204, *Annual Electric Power Survey of Capability and Load* (1957 and 1974).

TABLE 7.30. Utilization of Electrical Generating Capability by Type of Installation¹

| | Total of generating capability as a percentage of total net generating capability ² | | | | Utilization of generating capability by type ³ | | | | Ratio of firm peak load to total net generating capability ⁵ | Total net generating capability |
|----------------|--|---------|---------|-------|---|---------|---------|-------|---|---------------------------------|
| | Hydro | Thermal | Nuclear | Total | Hydro ⁴ | Thermal | Nuclear | Total | | |
| | per cent | | | | | | | | | thousands of kilowatts |
| 1920 | 92.7 | 7.3 | — | 100.0 | 48.0 | 17.4 | — | 45.7 | .. | .. |
| 1923 | 94.2 | 5.8 | — | 100.0 | 48.9 | 15.7 | — | 47.0 | .. | .. |
| 1926 | 95.8 | 4.2 | — | 100.0 | 46.8 | 15.4 | — | 45.5 | .. | .. |
| 1929 | 95.9 | 4.1 | — | 100.0 | 51.2 | 19.4 | — | 50.0 | .. | .. |
| 1933 | 95.3 | 4.7 | — | 100.0 | 37.0 | 14.7 | — | 35.9 | .. | .. |
| 1936 | 95.7 | 4.3 | — | 100.0 | 48.6 | 20.1 | — | 47.4 | .. | .. |
| 1939 | 95.3 | 4.7 | — | 100.0 | 51.2 | 19.8 | — | 49.8 | .. | .. |
| 1942 | 95.6 | 4.4 | — | 100.0 | 60.8 | 25.2 | — | 59.2 | .. | .. |
| 1945 | 95.3 | 4.7 | — | 100.0 | 57.6 | 27.0 | — | 56.1 | .. | .. |
| 1948 | 94.2 | 5.8 | — | 100.0 | 58.7 | 28.0 | — | 56.9 | .. | .. |
| 1950 | 91.6 | 8.4 | — | 100.0 | .. | .. | — | .. | 92.6 | 9,363 |
| 1952 | 87.9 ⁶ | 12.1 | — | 100.0 | .. | .. | — | .. | 91.9 | 11,004 |
| 1955 | 86.3 | 13.7 | — | 100.0 | .. | .. | — | .. | 89.6 | 14,147 |
| 1958 | 85.4 | 14.6 | — | 100.0 | 64.7 | 27.4 | — | 59.3 | 84.3 | 18,628 |
| 1961 | 80.8 | 19.2 | — | 100.0 | 64.4 | 25.1 | — | 56.8 | 81.2 | 22,753 |
| 1964 | 76.3 | 23.7 | — | 100.0 | 66.3 | 39.6 | — | 60.0 | 88.5 | 25,554 |
| 1967 | 71.4 | 28.1 | 0.5 | 100.0 | 67.4 | 42.0 | 9.8 | 60.0 | 88.4 | 31,370 |
| 1970 | 66.3 | 33.2 | 0.5 | 100.0 | 65.1 | 38.6 | 57.0 | 56.3 | 83.9 | 41,322 |
| 1973 | 64.7 | 31.1 | 4.2 | 100.0 | 63.2 | 37.7 | 71.3 | 55.7 | 80.0 | 53,807 |
| 1974 | 68.3 | 28.4 | 3.3 | 100.0 | 65.4 | 41.2 | 89.2 | 59.3 | 79.9 | 53,642 |

¹ Because of the extension of the class of producers of electricity surveyed, the data provided for the years 1920 - 48 is not exactly comparable with those for later years. The earlier series are based on the annual Census of Central Electric Stations and do not include industrial installations producing for their own use. From 1950 onwards, a wider range of producers were surveyed and, by 1958, about 99% of all electric generation in Canada was covered, including that by industry for its own use.

² For the years 1920 - 48 apportionment is based on kilovolt-ampere rating of dynamos; starting in 1950, it is based on net generating capability.

³ For the years 1920 - 48 figures shown were reported as "ratio of output to maximum capacity". Starting in 1950, utilization is calculated by expressing "net generation" as a percentage of "net generating capability multiplied by the number of hours in a year".

⁴ Figures in this category include, up until 1948, a small amount of electricity generated by non-hydro, auxiliary equipment. This typically amounted to no more than about 0.1% of all hydro generation for any one year.

⁵ Calculated by expressing "total indicated firm power peak load within Canada" as a percentage of "total net generating capability".

⁶ Because of the smaller class of establishments surveyed, overlaps with the earlier series do not agree exactly. For 1952, using the earlier, more restricted class of installations, 94.3% of capacity was hydraulic.

Source: Catalogue 57-202, *Central Electric Stations*; Catalogue 57-204, *Annual Electric Power Survey of Capability and Load*.

TABLE 7.31. Utilization of Electrical Generating Capability, by Type of Installation and by Province, 1974

| | Utilization of net generating capability ¹ | | | | Annual generating capability (assuming continuous operation at total net generating capability) | | Total indicated reserve as a percentage of total net capability ² |
|---------------------------------|---|--------------|---------|-------|---|----------------------|--|
| | Hydro | Fossil fuels | Nuclear | Total | millions of kilowatt hours | billions of B.t.u.'s | |
| | per cent | | | | | | |
| Newfoundland | 54.6 | 12.1 | — | 52.0 | 55,284 | 188,629 | 53.3 |
| Prince Edward Island | — | 38.3 | — | 38.3 | 999 | 3,409 | 30.7 |
| Nova Scotia | 52.3 | 53.6 | — | 53.4 | 10,109 | 34,492 | 17.1 |
| New Brunswick | 42.8 | 53.1 | — | 47.8 | 11,607 | 39,603 | 7.7 |
| Quebec | 69.1 | 3.8 | — | 66.0 | 126,994 | 433,304 | 16.6 |
| Ontario | 68.9 | 46.8 | 89.2 | 61.7 | 133,713 | 456,229 | 17.5 |
| Manitoba | 73.7 | 6.8 | — | 62.1 | 23,389 | 79,803 | 24.2 |
| Saskatchewan | 61.3 | 42.8 | — | 49.1 | 15,006 | 51,200 | 21.8 |
| Alberta | 24.5 | 54.7 | — | 47.6 | 29,898 | 102,012 | 26.1 |
| British Columbia | 69.3 | 15.2 | — | 58.0 | 61,609 | 210,210 | 22.5 |
| Yukon | 82.3 | 32.8 | — | 53.4 | 569 | 1,941 | 13.9 |
| Northwest Territories | 85.0 | 18.6 | — | 46.6 | 727 | 2,481 | 31.3 |
| Canada | 65.4 | 41.2 | 89.2 | 59.3 | 469,904 | 1,603,313 | 20.1 |

¹ Calculated by expressing "total net generation" as a percentage of "total net generating capability", the latter being calculated by assuming continuous year-round operation at "annual generating capability", that is by multiplying "net generating capability", when expressed in kilowatts, by 8,760 (the number of hours in a year).

² "Total net capability" is distinct from "total net generating capability". It is equal to the latter quantity, plus firm power committed for receipt from outside the province, less firm power committed for delivery to outside the province. "Net capability" is in a sense a measure of guaranteed availability. "Indicated reserve" is defined as the difference between "total net capability" and "total indicated firm power peak load".

Source: Catalogue 57-204, *Electric Power Statistics* (Vol. 1, 1974).

TABLE 7.32. Electricity as a Percentage of Total Energy Consumed in the Commercial and Industrial Sectors¹ and the Whole Economy by Region

| | Heat equivalent of electricity consumed as a percentage of total energy consumed | | | | | | | | |
|---|--|------|------|--------------------------------|------|------|------------------|------|------|
| | Commercial sector | | | Industrial sector ² | | | Whole economy | | |
| | 1958 | 1964 | 1973 | 1958 | 1964 | 1973 | 1958 | 1964 | 1973 |
| | per cent | | | | | | | | |
| Atlantic provinces | 13.6 | 11.5 | 24.0 | 17.6 | 22.7 | 23.8 | 6.5 | 8.0 | 11.7 |
| Quebec | 23.6 | 20.6 | 35.7 | 44.0 | 40.8 | 32.1 | 18.8 | 18.8 | 20.2 |
| Ontario | 22.5 | 21.1 | 27.6 | 14.7 | 14.6 | 15.8 | 11.0 | 11.6 | 14.2 |
| Manitoba | 16.5 ³ | 23.4 | 32.5 | 22.5 ³ | 27.8 | 25.1 | 6.0 ³ | 12.2 | 16.2 |
| Saskatchewan | | 18.7 | 26.6 | | 12.3 | 16.4 | | 5.2 | 9.6 |
| Alberta | 6.6 | 11.0 | 17.2 | 7.5 | 8.2 | 12.1 | 3.1 | 4.1 | 6.1 |
| British Columbia, Yukon and Northwest Territories | 23.2 | 28.1 | 27.9 | 41.3 | 39.3 | 34.6 | 17.1 | 18.1 | 18.5 |
| Canada | 19.4 | 19.5 | 28.3 | 25.3 | 24.1 | 22.8 | 11.6 | 12.5 | 14.7 |

¹ Since data are submitted to Statistics Canada by the energy supply industries on a non-coordinated basis, the sector allocations are estimates only.

² Does not include the energy supply industry.

³ Figures include both Manitoba and Saskatchewan.

Source: Same as in Table 7.17.

TABLE 7.33. Use of Electricity in Households¹

| | Percentage of households with | | Electricity as a percentage of all energy consumed in the residential and farm sectors ² |
|----------------|-------------------------------|------------------|---|
| | Electric water heaters | Electric heating | |
| 1961 | 45.9 | 0.7 ³ | 9.2 |
| 1966 | 51.6 | 1.7 | 12.1 |
| 1971 | 48.8 | 4.9 | 15.0 |
| 1973 | 48.1 | 7.0 | 17.0 |
| 1974 | 49.2 | 8.6 | .. |
| 1975 | 49.4 | 10.5 | .. |

¹ See footnote 1, Table 7.32.

² Excludes consumption of diesel fuel on farms.

³ This figure is from the 1961 Census of Canada; others are from the annual Survey of Household Facilities and Equipment.

Source: Catalogue 64-202, *Household Facilities and Equipment*, revised figures; Catalogue 57-505 (1958-1969), Catalogue 57-207 (1970-1971, 1973), *Detailed Energy Supply and Demand in Canada*.

TABLE 7.34. Ratio of Price of Electricity Purchased to Average Wages of Production Workers in the Manufacturing Industries

| | Average price of purchased electricity ¹ | Average hourly earnings | Ratio of price of electricity to wages |
|----------------|---|-------------------------|--|
| | dollars per thousand kilowatt hours | dollars per man hour | |
| 1939 | 2.96 | 0.43 ² | 6.93 |
| 1946 | 3.30 | 0.71 | 4.65 |
| 1951 | 3.97 | 1.18 | 3.36 |
| 1956 | 4.74 | 1.52 | 3.12 |
| 1961 | 5.55 | 1.83 | 3.03 |
| 1966 | 6.03 | 2.25 | 2.68 |
| 1971 | 7.26 | 3.28 | 2.21 |
| 1972 | 7.46 | 3.54 | 2.11 |
| 1973 | 7.91 | 3.85 | 2.06 |

¹ The average prices shown were obtained by dividing total value of electricity purchased by the manufacturing industry by the total quantity expressed in kilowatt hours.

² The figure for 1939 is based on results derived from annual census of manufacturing industries, while the later data are based on monthly surveys.

Source: Catalogue 31-201, *General Review of Manufacturing Industries in Canada* (1948, 1951, and 1961); Catalogue 57-002, *Energy Statistics*, Service Bulletin (Vol. 5, No. 41, Vol. 9, No. 48, Vol. 10, No. 7 and Vol. 11, No. 2); Catalogue 72-002, *Employment Earnings and Hours*.

Chart — 7.35

**Ratio of Average Price of Purchased Electricity
to Average Hourly Earnings of Production
Workers in the Manufacturing Industry**



Source: Same as in Table 7.34.

TABLE 7.36. Proven Reserves, Production and Domestic Use of Canadian Crude Oil

| | Proven reserves ¹ as of January 1 | Percentage change | Annual production | Percentage change | Domestic use ² | Percentage change |
|------------|--|-------------------|---------------------|-------------------|---------------------------|-------------------|
| | millions of barrels | | millions of barrels | | millions of barrels | |
| 1951 | 1,203 | .. | 47 | .. | 130 | .. |
| 1956 | 2,510 | 109 | 169 | 260 | 232 | 78 |
| 1961 | 3,679 | 47 | 221 | 31 | 294 | 27 |
| 1966 | 6,711 | 82 | 316 | 43 | 379 | 29 |
| 1971 | 8,559 | 28 | 480 | 52 | 507 | 34 |
| 1974 | 7,674 | - 10 | 601 | 25 | 646 | 27 |

¹ Economically viable.

² Includes use of imported crude oil.

Source: Canadian Petroleum Association Statistical Yearbook (1974); Catalogue 26-213, *The Crude Petroleum and Natural Gas Industry*.

TABLE 7.37. Proven Reserves, Production and Domestic Use of Canadian Natural Gas

| | Proven reserves as of January 1 | Percentage change | Annual production | Percentage change | Domestic use ¹ | Percentage change |
|------------|---------------------------------|-------------------|------------------------|-------------------|---------------------------|-------------------|
| | billions of cubic feet | | billions of cubic feet | | billions of cubic feet | |
| 1956 | 14,642 | .. | 193 | .. | 144 | .. |
| 1961 | 26,994 | 84 | 694 | 260 | 371 | 158 |
| 1966 | 40,355 | 49 | 1,125 | 62 | 636 | 71 |
| 1971 | 53,376 | 32 | 1,953 | 74 | 1,001 | 57 |
| 1974 | 52,457 | - 2 | 2,393 | 23 | 1,315 | 31 |

¹ Includes use of imported natural gas.

Source: Same as in Table 7.36.

TABLE 7.38. Proven Reserves, Production and Domestic Use of Canadian Crude Oil and Natural Gas in B.t.u. Equivalents¹

| | Oil | Gas | Total | Percentage change |
|------------------|---------------------------|------|-------|-------------------|
| | 10 ¹⁵ B.t.u.'s | | | |
| Proven reserves: | | | | |
| 1951 | 7.0 | 15.7 | 30.3 | ... |
| 1956 | 14.6 | 28.9 | 50.2 | 66 |
| 1961 | 21.3 | | | |
| 1966 | 38.9 | 43.2 | 82.1 | 64 |
| 1971 | 49.6 | 57.1 | 106.7 | 30 |
| 1974 | 44.5 | 56.1 | 100.6 | - 6 |
| Production: | | | | |
| 1951 | 0.27 | 0.21 | 1.19 | ... |
| 1956 | 0.98 | 0.74 | 2.02 | 70 |
| 1961 | 1.28 | | | |
| 1966 | 1.83 | 1.20 | 3.03 | 50 |
| 1971 | 2.78 | 2.09 | 4.87 | 61 |
| 1974 | 3.49 | 2.56 | 6.05 | 24 |
| Domestic use: | | | | |
| 1951 | 0.76 | 0.15 | 1.50 | ... |
| 1956 | 1.35 | 0.40 | 2.11 | 41 |
| 1961 | 1.71 | | | |
| 1966 | 2.20 | 0.68 | 2.88 | 36 |
| 1971 | 2.94 | 1.07 | 4.01 | 39 |
| 1974 | 3.75 | 1.41 | 5.16 | 29 |

¹ One barrel (35 Canadian gallons) of crude oil = 5.8×10^6 B.t.u.'s. One thousand cubic feet of natural gas = 1.07×10^6 B.t.u.'s.

Source: Same as in Table 7.36.

TABLE 7.39. Supply of Canadian Crude Oil and Equivalents¹ by Source, 1974

| Province | Production | Production as a percentage of | |
|--|----------------------|-------------------------------|--------------|
| | | Domestic production | Total supply |
| | thousands of barrels | | |
| New Brunswick | 8 | -- | -- |
| Ontario | 734 | 0.1 | -- |
| Manitoba | 4,749 | 0.7 | 0.5 |
| Saskatchewan | 74,142 | 11.0 | 7.6 |
| Alberta | 572,150 | 85.0 | 58.9 |
| British Columbia | 20,071 | 3.0 | 2.1 |
| Northwest Territories | 954 | 0.2 | 0.1 |
| Total domestic supply | 672,808 | 100.0 | 69.2 |
| Imports | 299,239 | ... | 30.8 |
| Total supply | 972,047 | ... | 100.0 |

¹ Includes synthetic crude oil, condensate and pentanes plus.

Source: Catalogue 26-213, *The Crude Petroleum and Natural Gas Industry* (1974).

TABLE 7.40. Canadian Crude Oil Use, 1974

| Province | Use | As a percentage of | |
|---|----------------------|--------------------|--------------|
| | | Domestic supply | Total supply |
| | thousands of barrels | | |
| Disposition of domestic supply: | | | |
| Atlantic provinces. | 3,837 | 0.6 | 0.4 |
| Quebec. | 23,085 | 3.4 | 2.4 |
| Ontario. | 166,124 | 24.5 | 17.0 |
| Manitoba. | 17,430 | 2.6 | 1.8 |
| Saskatchewan. | 19,516 | 2.9 | 2.0 |
| Alberta. | 63,364 | 9.4 | 6.5 |
| British Columbia. | 52,217 | 7.7 | 5.3 |
| Northwest Territories. | 975 | 0.1 | 0.1 |
| Total domestic supply used in Canada | 346,548 | 51.2 | 35.5 |
| Exports. | 330,583 | 48.8 | 33.9 |
| Total domestic supply | 677,131 | 100.0 | 69.4 |
| Disposition of imports: | | | |
| Atlantic provinces. | 127,095 | ... | 13.0 |
| Quebec. | 172,114 | ... | 17.6 |
| Total supply. | 976,340 | ... | 100.0 |

Source: Same as in Table 7.39.

TABLE 7.41. Canadian Marketable Gas Supply by Source, 1974

| | Source of supply ¹ | Percentage of total supply |
|--|-------------------------------|----------------------------|
| | millions of cubic feet | |
| New Brunswick. | 88 | -- |
| Quebec. | 183 | -- |
| Ontario. | 7,404 | 0.3 |
| Saskatchewan. | 51,467 | 2.0 |
| Alberta. | 1,993,935 | 78.1 |
| British Columbia. | 366,082 | 14.3 |
| Yukon and Northwest Territories. | 979 | -- |
| Other ² | 121,342 | 4.8 |
| Imports. | 13,408 | 0.5 |
| Total supply. | 2,554,888 | 100.0 |

¹ Total supply of marketable gas.

² Receipts from distribution storage and temporary supply.

Source: Same as in Table 7.39.

TABLE 7.42. Canadian Natural Gas Use, 1974

| | Use | Percentage of total supply |
|---------------------------------------|------------------------|----------------------------|
| | millions of cubic feet | |
| New Brunswick | 66 | -- |
| Quebec | 80,171 | 3.2 |
| Ontario | 651,200 | 25.5 |
| Manitoba | 63,885 | 2.5 |
| Saskatchewan | 92,670 | 3.6 |
| Alberta | 297,397 | 11.7 |
| British Columbia | 128,932 | 5.0 |
| Northwest Territories | 979 | -- |
| Total used in Canada | 1,315,300 | 51.5 |
| Exports | 959,187 | 37.5 |
| Other ¹ | 280,401 | 11.0 |
| Total supply | 2,554,888 | 100.0 |

¹ Direct deliveries for industrial consumption and miscellaneous utility deliveries; deliveries to distributor storage; line pack fluctuation; pipeline fuel and pipeline losses.

Source: Same as in Table 7.39.

TABLE 7.43. Selected Indicators of Crude Oil and Natural Gas Use

| | Depletion rate ¹ | | Self-sufficiency rate ² | | Use per household |
|----------------|-----------------------------|------------------------|------------------------------------|-------------|-------------------------------|
| | Crude oil life index | Natural gas life index | Crude oil | Natural gas | |
| | years | | | | millions of B.t.u.'s per year |
| 1951 | 26 | .. | 9 | .. | .. |
| 1956 | 15 | 76 | 11 | 102 | 382 |
| 1961 | 17 | 39 | 13 | 73 | 463 |
| 1966 | 21 | 36 | 18 | 63 | 556 |
| 1971 | 18 | 27 | 17 | 53 | 664 |
| 1974 | 13 | 22 | 12 | 40 | 794 |

¹ $\frac{\text{Reserves}}{\text{Production}}$ = life index (in years).

² $\frac{\text{Reserves}}{\text{Domestic use}}$ = self-sufficiency rate (in years).

Source: Data used in Tables 7.36 - 7.38, 7.40 and 7.42.

APPENDICES

APPENDIX 1

Watersheds

Delineating the Watersheds

The basis for the system used here is the Hydrometric Map Series (scale 1:2,500,000) used by the Water Survey of Canada Division of Environment Canada. The watersheds on these maps were aggregated into a manageable number and each was given a unique code. The boundaries of these areas were then transferred to National Topographic System (NTS) maps of 1:250,000 or 1:500,000 scale, depending on the density of settlement in the region.

Retrieving Census of Population Data

Using the NTS maps, Census Field geocoded the boundaries and the census data within these areas were retrieved. Geocoding involves giving the Universal Transverse Mercator (UTM) coordinates to points along the boundary line. The number of points coded varies directly with the density of settlements and the sinuosity of the boundary line. The coordinates of the boundary line points are stored in the system.

The census data are collected according to Enumeration Areas (EA's) and stored at the UTM coordinates of the population centroid of the EA. Therefore, data for all the centroids which are located within the

watershed boundaries are retrieved for that watershed. This means, however, that if an EA is divided between two watersheds, all the data will be placed in the watershed in which the centroid is located. There is no proportional division of the data into the other watershed.

The total area measurement for EA's is not available; therefore, the areas of the watersheds were calculated using a Hewlett-Packard digitizer. The boundary lines of the sheds were traced with an electronic sensor and the area within the boundaries automatically calculated using the 1:2,500,000 scale hydrometric maps. The areas of the large lakes enclosed in the sheds were subtracted from the shed areas. The area of the islands of the Arctic Archipelago were not calculated.

Retrieving Census of Manufactures Data

Data on manufacturing establishments are collected and compiled by the Standard Geographical Code of the municipality in which the establishment is located. The municipalities were allocated to the appropriate watershed and tabulations on manufacturing data by watershed were generated. Due to confidentiality requirements, data for some of the watersheds could not be published.

APPENDIX 2

Watershed Code and Provincial Code

1. Atlantic Basin

10. Atlantic Ocean

- 100 - 10 Labrador
- 101 - 10 North Coast Newfoundland
- 102 - 10 Trinity Bay
- 103 - 10 St. John's
- 104 - 12 South Coast Nova Scotia

11. Gulf of St. Lawrence

- 110 North Coast Mainland:
- 110 - 10 Labrador
- 110 - 24 Quebec
- 111 - 10 West and South Coast Newfoundland
- 112 - 24 North Gaspé Peninsula
- 113 West Coast Mainland:
- 113 - 12 Nova Scotia
- 113 - 13 New Brunswick
- 113 - 24 Quebec
- 114 - 11 Prince Edward Island
- 115 - 12 Cape Breton Island

12. Bay of Fundy

- 120 - 12 Nova Scotia part
- 121 - 13 New Brunswick part

13. Saint John River

- 130 Saint John River:
- 130 - 13 New Brunswick part
- 130 - 24 Quebec part

14. St. Lawrence River

- 140 - 24 Saguenay River
- 141 - 24 Québec City
- 142 - 24 Chaudière River
- 143 - 24 St. Maurice River
- 144 - 24 Eastern Townships
- 145 - 24 Eastern Laurentians
- 146 - 24 Montréal
- 147 West St. Lawrence:
- 147 - 24 Quebec part
- 147 - 35 Ontario part

15. Ottawa River

- 150 Lower Ottawa:
- 150 - 24 Quebec part
- 150 - 35 Ontario part
- 151 Upper Ottawa:
- 151 - 24 Quebec part
- 151 - 35 Ontario part

16. Lake Ontario

- 160 - 35 Belleville
- 161 - 35 Trent System
- 162 - 35 Oshawa-Colborne
- 163 - 35 Toronto
- 164 - 35 Hamilton
- 165 - 35 Niagara Peninsula

17. Lake Erie and Lake St. Clair

- 170 - 35 Grand River
- 171 - 35 Erie Shoreline
- 172 - 35 Thames River
- 173 - 35 Sydenham River

18. Lake Huron

- 180 - 35 South Huron
- 181 - 35 Georgian Bay-Lake Simcoe
- 182 - 35 North Huron

19. Lake Superior

- 190 - 35 Lake Superior

2. Hudson Bay and Ungava Basin

20. East plus Ungava

- 200 - 24 East plus Ungava

21. South and West

- 210 South and Southwest:
- 210 - 24 Quebec part
- 210 - 35 Ontario part
- 210 - 46 Manitoba part
- 211 North of Nelson River:
- 211 - 46 Manitoba part including Churchill
- 211 - 47 Saskatchewan part
- 211 - 48 Alberta part
- 211 - 61 Northwest Territories

22. Nelson River

- 220 - 46 Nelson River

23. Lake Winnipeg

- 230 Lake Winnipeg:
- 230 - 35 Lake of the Woods (Ontario)
- 230 - 46 Lake Winnipeg Shoreline (Manitoba)
- 231 - 46 Red River
- 232 Dauphin:
- 232 - 46 Manitoba part
- 232 - 47 Saskatchewan part

24. Assiniboine River

- 240 Assiniboine and Souris:
- 240 - 46 Manitoba part
- 240 - 47 Saskatchewan part
- 241 Qu'Appelle River:
- 241 - 46 Manitoba part
- 241 - 47 Saskatchewan part

25. Saskatchewan River

- 250 Saskatchewan River:
- 250 - 46 Manitoba part
- 250 - 47 Saskatchewan part
- 251 - 48 Upper North Saskatchewan (above Edmonton)
- 252 Lower North Saskatchewan:
- 252 - 47 Saskatchewan part
- 252 - 48 Alberta part
- 253 South Saskatchewan and Red Deer:
- 253 - 47 Saskatchewan part
- 253 - 48 Alberta part
- 254 - 48 Bow River

3. Arctic Basin

30. Mackenzie River

- 300 Mackenzie River:
- 300 - 47 Saskatchewan part

Watershed Code and Provincial Code — Concluded

3. Arctic Basin — Concluded:

30. Mackenzie River — Concluded:

- 300 - 48 Alberta part
- 300 - 59 British Columbia part
- 300 - 60 Yukon part
- 300 - 61 Northwest Territories part

31. Athabasca River

- 310 Athabasca River:
- 310 - 47 Saskatchewan part
- 310 - 59 Alberta part

32. Peace River

- 320 Peace River:
- 320 - 48 Alberta part
- 320 - 59 British Columbia part

33. Arctic Ocean

- 330 - 61 Arctic Ocean (Arctic Islands and North Shore Northwest Territories)

4. Pacific Basin

40. Columbia River

- 400 - 59 Columbia River
- 401 - 59 Okanagan River
- 402 - 59 Similkameen River

41. Fraser River

- 410 - 59 Upper Fraser River
- 411 - 59 Thompson River
- 412 - 59 Lower Fraser River (Vancouver)

42. Yukon River

- 420 Yukon River:
- 420 - 59 British Columbia part
- 420 - 60 Yukon part

43. West Coast

- 430 Alsek River:
- 430 - 59 British Columbia part
- 430 - 60 Yukon part
- 431 - 59 Northern Coast
- 432 - 59 Southern Coast
- 433 - 59 South Vancouver Island (Victoria)
- 434 - 59 Skagit River

5. Gulf of Mexico Basin

50. Gulf of Mexico Basin:

- 500 Gulf of Mexico Basin:
- 500 - 47 Saskatchewan part
- 500 - 48 Alberta part

APPENDIX 3
Population and Dwelling Characteristics by Watershed, 1971

| Watershed code and provincial code | Population | Area | Population density | Dwellings by source of water | | | Dwellings by method of sewage disposal | | |
|--|------------|--------------|----------------------------|------------------------------|---------|---------|--|-------------|---------|
| | | | | Municipal supply | Well | Other | Public sewer | Septic tank | Other |
| | | square miles | population per square mile | | | | | | |
| 1. Atlantic Basin | 15,481,700 | 510,994 | 30.3 | 3,431,450 | 712,925 | 111,875 | 3,174,115 | 711,650 | 370,400 |
| 10. Atlantic Ocean | 716,275 | 131,628 | 5.4 | 97,925 | 67,675 | 8,775 | 91,095 | 43,405 | 39,885 |
| 100-10 | 26,185 | 98,528 | 0.3 | 4,055 | 370 | 750 | 4,010 | 200 | 970 |
| 101-10 | 119,565 | 19,331 | 6.2 | 12,545 | 9,395 | 2,775 | 9,520 | 4,770 | 10,420 |
| 102-10 | 67,760 | 2,936 | 23.1 | 1,945 | 11,800 | 1,805 | 1,590 | 5,895 | 8,065 |
| 103-10 | 144,955 | 1,164 | 124.5 | 21,780 | 9,455 | 1,055 | 20,585 | 7,740 | 3,965 |
| 104-12 | 357,810 | 9,669 | 37.0 | 57,600 | 36,655 | 2,390 | 55,390 | 24,800 | 16,465 |
| 11. Gulf of St. Lawrence | 1,089,635 | 124,671 | 8.7 | 119,580 | 102,965 | 18,740 | 102,325 | 64,700 | 74,245 |
| 110 | 114,735 | 67,332 | 1.7 | 17,815 | 4,445 | 1,620 | 15,870 | 1,830 | 6,175 |
| 110-10 | 1,980 | 12,594 | 0.2 | — | 145 | 200 | — | 135 | 210 |
| 110-24 | 112,755 | 54,737 | 2.1 | 17,815 | 4,300 | 1,420 | 15,870 | 1,695 | 5,965 |
| 111-10 | 161,655 | 21,724 | 7.4 | 15,570 | 11,435 | 5,110 | 11,480 | 7,920 | 12,715 |
| 112-24 | 146,130 | 5,388 | 27.1 | 20,525 | 9,720 | 1,415 | 17,975 | 2,040 | 11,640 |
| 113 | 385,470 | 24,116 | 16.0 | 31,145 | 48,265 | 6,700 | 27,065 | 28,210 | 30,830 |
| 113-13 | 212,440 | 13,428 | 15.8 | 12,515 | 30,235 | 3,445 | 11,365 | 19,220 | 15,600 |
| 113-24 | 95,920 | 8,389 | 11.4 | 8,835 | 9,535 | 1,490 | 7,160 | 1,725 | 10,980 |
| 113-12 | 77,110 | 2,299 | 33.5 | 9,795 | 8,495 | 1,765 | 8,540 | 7,265 | 4,250 |
| 114-11 | 111,640 | 2,186 | 51.1 | 9,730 | 17,320 | 740 | 9,370 | 12,255 | 6,165 |
| 115-12 | 170,005 | 3,926 | 43.3 | 24,795 | 11,780 | 3,155 | 20,565 | 12,445 | 6,720 |
| 12. Bay of Fundy | 313,445 | 10,078 | 31.1 | 39,415 | 39,405 | 6,630 | 35,540 | 32,540 | 17,370 |
| 120-12 | 184,020 | 5,934 | 31.0 | 18,420 | 27,420 | 4,640 | 12,650 | 12,650 | 17,370 |
| 121-13 | 129,425 | 4,144 | 31.2 | 20,995 | 11,985 | 1,990 | 19,890 | 10,355 | 4,720 |
| 13. Saint John River | 337,080 | 14,543 | 23.2 | 49,605 | 27,990 | 8,025 | 45,880 | 19,960 | 19,780 |
| 130-13 | 292,690 | 11,524 | 25.4 | 45,530 | 23,510 | 7,040 | 42,695 | 19,045 | 14,340 |
| 130-24 | 44,390 | 3,019 | 14.7 | 4,075 | 4,480 | 985 | 3,185 | 915 | 5,440 |
| 14. St. Lawrence River | 5,276,660 | 82,909 | 63.6 | 1,278,960 | 133,930 | 27,365 | 1,226,480 | 87,425 | 126,370 |
| 140-24 | 267,400 | 34,022 | 7.9 | 50,450 | 3,825 | 1,935 | 45,975 | 2,540 | 7,695 |
| 141-24 | 558,600 | 7,338 | 76.1 | 132,265 | 7,960 | 4,115 | 123,510 | 6,005 | 14,835 |
| 142-24 | 382,920 | 7,465 | 51.3 | 56,165 | 27,980 | 5,215 | 49,470 | 8,780 | 31,105 |
| 143-24 | 183,510 | 17,536 | 10.5 | 45,155 | 1,575 | 1,085 | 42,810 | 1,835 | 3,175 |
| 144-24 | 785,895 | 8,817 | 89.1 | 149,855 | 43,155 | 7,670 | 139,805 | 26,800 | 34,080 |
| 145-24 | 185,955 | 3,480 | 53.4 | 31,955 | 11,260 | 2,420 | 24,790 | 7,425 | 13,415 |
| 146-24 | 2,667,375 | 1,926 | 1,384.9 | 763,535 | 20,345 | 3,440 | 751,805 | 19,350 | 16,165 |
| 147 | 245,005 | 2,325 | 105.4 | 26,845 | 17,830 | 1,485 | 48,315 | 14,690 | 5,900 |
| 147-24 | 64,010 | 395 | 162.1 | 12,820 | 3,805 | 195 | 12,240 | 2,495 | 2,080 |
| 147-35 | 180,995 | 1,931 | 93.7 | 36,775 | 14,025 | 1,290 | 36,075 | 12,195 | 3,820 |
| 15. Ottawa River | 1,178,150 | 57,977 | 20.3 | 238,140 | 71,320 | 11,445 | 222,480 | 62,470 | 36,230 |
| 150 | 802,180 | 21,837 | 36.7 | 170,660 | 44,155 | 7,360 | 159,510 | 39,780 | 22,885 |
| 150-24 | 323,005 | 18,137 | 17.8 | 61,830 | 15,490 | 5,525 | 55,120 | 12,225 | 15,495 |
| 150-35 | 479,175 | 3,700 | 129.5 | 108,830 | 28,665 | 1,835 | 104,390 | 27,555 | 7,390 |
| 151 | 375,970 | 36,139 | 10.4 | 67,480 | 27,165 | 4,085 | 62,970 | 22,690 | 13,345 |
| 151-24 | 94,410 | 19,955 | 4.7 | 15,005 | 6,670 | 985 | 13,775 | 4,045 | 4,845 |
| 151-35 | 281,560 | 16,185 | 17.4 | 52,745 | 20,495 | 3,100 | 49,195 | 18,645 | 8,500 |
| 16. Lake Ontario | 3,981,490 | 12,273 | 324.4 | 1,064,550 | 91,645 | 11,455 | 1,002,195 | 145,245 | 20,120 |
| 160-35 | 159,680 | 3,123 | 51.1 | 27,785 | 15,355 | 2,410 | 24,450 | 15,745 | 5,360 |
| 161-35 | 193,760 | 5,198 | 37.3 | 31,565 | 22,700 | 2,625 | 26,680 | 24,765 | 5,445 |
| 162-35 | 173,240 | 485 | 357.2 | 39,975 | 8,980 | 595 | 36,725 | 11,665 | 1,070 |
| 163-35 | 2,434,505 | 1,203 | 2,023.7 | 703,650 | 16,065 | 2,090 | 682,240 | 34,960 | 4,600 |
| 164-35 | 630,530 | 996 | 633.1 | 165,485 | 15,030 | 1,105 | 150,735 | 29,430 | 1,455 |
| 165-35 | 389,775 | 1,268 | 307.4 | 96,090 | 13,515 | 2,630 | 81,365 | 28,680 | 2,190 |
| 17. Lake Erie and Lake St. Clair | 1,472,295 | 9,395 | 156.7 | 339,355 | 85,285 | 6,390 | 277,800 | 139,700 | 13,510 |
| 170-35 | 489,875 | 2,999 | 163.3 | 111,250 | 27,745 | 2,205 | 103,040 | 33,560 | 4,595 |
| 171-35 | 462,590 | 2,984 | 155.0 | 104,555 | 27,485 | 1,915 | 70,755 | 59,140 | 4,050 |
| 172-35 | 426,045 | 2,318 | 183.8 | 105,520 | 20,725 | 1,415 | 92,110 | 32,545 | 3,005 |
| 173-35 | 93,785 | 1,094 | 85.7 | 18,030 | 9,330 | 855 | 11,895 | 14,455 | 1,860 |
| 18. Lake Huron | 966,330 | 36,549 | 26.4 | 169,185 | 86,350 | 11,615 | 137,650 | 110,150 | 19,350 |
| 180-35 | 259,150 | 6,271 | 41.3 | 46,460 | 27,090 | 2,615 | 32,230 | 38,790 | 5,150 |
| 181-35 | 321,915 | 8,690 | 37.0 | 49,904 | 37,690 | 5,045 | 37,160 | 48,320 | 7,150 |
| 182-35 | 385,265 | 21,588 | 17.8 | 72,820 | 21,570 | 3,955 | 68,260 | 23,040 | 7,050 |
| 19. Lake Superior: | | | | | | | | | |
| 190-35 | 150,340 | 30,972 | 4.9 | 34,465 | 6,360 | 1,435 | 32,670 | 6,055 | 3,540 |
| 2. Hudson Bay and Ungava Basin | 3,669,060 | 1,335,649 | 2.7 | 785,175 | 187,025 | 75,855 | 762,395 | 127,175 | 158,490 |
| 20. East plus Ungava: | | | | | | | | | |
| 200-24 | 10,305 | 283,218 | 0.04 | 920 | 15 | 1,085 | 860 | 50 | 1,115 |
| 21. South and West Hudson Bay | 292,265 | 689,929 | 0.4 | 43,690 | 15,565 | 8,850 | 39,620 | 10,095 | 18,400 |
| 210 | 227,685 | 336,356 | 0.7 | 38,285 | 10,845 | 4,620 | 34,585 | 8,500 | 10,675 |
| 210-24 | 105,180 | 66,940 | 1.6 | 15,880 | 6,420 | 1,075 | 15,165 | 2,315 | 5,900 |
| 210-35 | 117,800 | 226,769 | 0.5 | 22,385 | 4,420 | 2,840 | 19,410 | 6,150 | 4,090 |
| 210-46 | 4,705 | 42,648 | 0.1 | 20 | 5 | 705 | 10 | 35 | 685 |
| 211 | 64,580 | 353,573 | 0.2 | 5,405 | 4,720 | 4,230 | 5,035 | 1,595 | 7,725 |
| 211-46 | 8,200 | 76,224 | 0.1 | 1,160 | 20 | 575 | 1,065 | 80 | 610 |
| 211-47 | 28,115 | 63,968 | 0.4 | 1,260 | 2,555 | 2,515 | 1,070 | 775 | 4,475 |
| 211-48 | 25,035 | 7,096 | 3.5 | 2,925 | 2,145 | 600 | 2,875 | 725 | 2,075 |
| 211-61 | 3,230 | 206,285 | 0.02 | 60 | — | 540 | 25 | 15 | 565 |

Population and Dwelling Characteristics by Watershed, 1971 — Concluded

| Watershed code and provincial code | Population | Area | Population density | Dwellings by source of water | | | Dwellings by method of sewage disposal | | |
|---|------------|--------------|----------------------------|------------------------------|--------|--------|--|-------------|--------|
| | | | | Municipal supply | Well | Other | Public sewer | Septic tank | Other |
| | | square miles | population per square mile | | | | | | |
| 2. Hudson Bay and Ungava Basin — Concluded: | | | | | | | | | |
| 22. Nelson River: | | | | | | | | | |
| 220-46 | 30,315 | 34,435 | 0.9 | 5,545 | 40 | 1,240 | 5,490 | 120 | 1,220 |
| 23. Lake Winnipeg | 645,845 | 108,453 | 6.0 | 121,185 | 44,460 | 16,505 | 116,010 | 30,850 | 35,275 |
| 230 | 114,385 | 70,985 | 1.6 | 15,670 | 9,505 | 5,215 | 13,700 | 7,890 | 8,795 |
| 230-35 | 73,125 | 43,993 | 1.7 | 12,485 | 4,335 | 2,875 | 10,780 | 4,960 | 3,950 |
| 230-46 | 41,260 | 26,992 | 1.5 | 3,185 | 5,170 | 2,340 | 2,920 | 2,930 | 4,845 |
| 231-46 | 427,265 | 9,997 | 42.7 | 96,220 | 20,235 | 5,405 | 93,550 | 15,975 | 12,340 |
| 232 | 104,195 | 27,471 | 3.8 | 9,295 | 14,720 | 5,885 | 8,760 | 6,985 | 14,140 |
| 232-46 | 83,095 | 20,295 | 4.1 | 7,335 | 12,300 | 3,960 | 6,990 | 5,980 | 10,615 |
| 232-47 | 21,100 | 7,176 | 2.9 | 1,960 | 2,420 | 1,925 | 1,770 | 1,005 | 3,525 |
| 24. Assiniboine River | 819,820 | 62,269 | 13.2 | 189,300 | 39,875 | 19,845 | 184,965 | 26,190 | 37,870 |
| 240 | 520,215 | 35,036 | 14.8 | 121,115 | 27,180 | 11,335 | 118,815 | 16,945 | 23,865 |
| 240-46 | 371,500 | 12,995 | 28.6 | 98,575 | 13,735 | 4,375 | 97,325 | 9,790 | 9,575 |
| 240-47 | 148,715 | 22,040 | 6.7 | 22,540 | 13,445 | 6,960 | 21,490 | 7,155 | 14,290 |
| 241 | 299,605 | 27,234 | 11.0 | 68,185 | 12,695 | 8,510 | 66,150 | 9,245 | 14,005 |
| 241-46 | No pop. | 33 | ... | ... | ... | ... | ... | ... | ... |
| 241-47 | 299,605 | 27,201 | 11.0 | 68,185 | 12,695 | 8,510 | 66,150 | 9,245 | 14,005 |
| 25. Saskatchewan River | 1,870,510 | 157,344 | 11.9 | 424,535 | 87,070 | 28,330 | 415,450 | 59,870 | 64,610 |
| 250 | 71,375 | 29,454 | 2.4 | 10,630 | 4,625 | 9,915 | 9,915 | 2,495 | 7,370 |
| 250-46 | 21,910 | 7,035 | 3.1 | 4,390 | 425 | 955 | 4,235 | 330 | 1,210 |
| 250-47 | 49,465 | 22,419 | 2.2 | 6,240 | 4,200 | 3,565 | 5,680 | 2,165 | 6,160 |
| 251-48 | 203,275 | 10,771 | 18.9 | 52,395 | 5,920 | 1,160 | 51,790 | 3,740 | 3,945 |
| 252 | 643,585 | 48,350 | 13.3 | 133,730 | 40,080 | 8,390 | 131,840 | 22,740 | 27,615 |
| 252-48 | 502,245 | 25,543 | 19.7 | 112,130 | 27,525 | 3,855 | 111,000 | 16,265 | 16,245 |
| 252-47 | 141,340 | 22,807 | 6.2 | 21,600 | 12,555 | 4,535 | 20,840 | 6,475 | 11,370 |
| 253 | 503,175 | 59,129 | 8.5 | 102,680 | 30,205 | 11,850 | 97,720 | 24,810 | 22,200 |
| 253-47 | 224,310 | 22,251 | 10.1 | 51,105 | 8,985 | 6,230 | 49,815 | 6,080 | 10,425 |
| 253-48 | 278,865 | 36,878 | 7.6 | 51,575 | 21,220 | 5,620 | 47,905 | 18,730 | 11,775 |
| 254-48 | 449,100 | 9,640 | 46.6 | 125,100 | 6,240 | 2,410 | 124,185 | 6,085 | 3,480 |
| 3. Arctic Basin | 250,415 | .. | .. | 32,695 | 13,385 | 16,570 | 30,410 | 9,720 | 22,530 |
| 30. Mackenzie River: | | | | | | | | | |
| 300 | 34,125 | 469,101 | 0.1 | 4,755 | 425 | 2,660 | 4,240 | 800 | 2,810 |
| 300-60 and 61 | 23,230 | 342,507 | 0.1 | 3,340 | 240 | 1,850 | 2,990 | 445 | 1,985 |
| 300-47 | 3,340 | 39,796 | 0.1 | 525 | 20 | 200 | 520 | 30 | 200 |
| 300-48 | 2,575 | 30,611 | 0.1 | 145 | 50 | 310 | 110 | 55 | 350 |
| 300-59 | 4,980 | 56,187 | 0.1 | 745 | 115 | 300 | 620 | 270 | 275 |
| 31. Athabasca River: | | | | | | | | | |
| 310 | 81,440 | 60,605 | 1.3 | 10,380 | 8,510 | 2,690 | 9,915 | 4,095 | 7,575 |
| 310-47 | No pop. | 6,273 | ... | ... | ... | ... | ... | ... | ... |
| 310-48 | 81,440 | 54,332 | 1.5 | 10,380 | 8,510 | 2,690 | 9,915 | 4,095 | 7,575 |
| 32. Peace River: | | | | | | | | | |
| 320 | 125,380 | 120,753 | 1.0 | 17,300 | 4,445 | 9,620 | 16,055 | 4,790 | 10,520 |
| 320-48 | 81,750 | 72,764 | 1.1 | 10,185 | 3,610 | 6,630 | 9,775 | 3,230 | 7,420 |
| 320-59 | 43,630 | 47,989 | 0.9 | 7,115 | 835 | 2,990 | 6,280 | 1,560 | 3,100 |
| 33. Arctic Ocean: | | | | | | | | | |
| 330-61 | 9,470 | .. | .. | 260 | 5 | 1,600 | 200 | 35 | 1,625 |
| 4. Pacific Basin | 2,153,125 | 381,713 | 5.6 | 582,560 | 51,405 | 26,010 | 464,135 | 172,295 | 23,540 |
| 40. Columbia River | 252,030 | 39,685 | 6.4 | 59,075 | 10,075 | 6,610 | 39,065 | 32,025 | 4,675 |
| 400-59 | 132,135 | 33,530 | 3.9 | 29,380 | 4,675 | 4,735 | 20,610 | 14,675 | 3,505 |
| 401-59 | 113,160 | 3,262 | 34.7 | 28,430 | 4,805 | 1,635 | 17,740 | 16,165 | 970 |
| 402-59 | 6,735 | 2,893 | 2.3 | 1,265 | 595 | 240 | 715 | 1,185 | 200 |
| 41. Fraser River | 1,261,595 | 89,693 | 14.1 | 351,250 | 27,135 | 10,965 | 293,745 | 83,940 | 11,665 |
| 410-59 | 153,355 | 65,619 | 2.3 | 26,870 | 8,680 | 5,220 | 18,985 | 15,535 | 6,250 |
| 411-59 | 100,820 | 21,685 | 4.6 | 19,560 | 4,420 | 3,425 | 12,240 | 12,785 | 2,380 |
| 412-59 | 1,007,420 | 2,389 | 421.7 | 304,820 | 14,035 | 2,320 | 262,520 | 55,620 | 3,035 |
| 42. Yukon River: | | | | | | | | | |
| 420 | 17,200 | 123,057 | 0.1 | 3,485 | 410 | 910 | 2,915 | 945 | 945 |
| 420-59 | 305 | 9,041 | 0.03 | 10 | 10 | 90 | — | 50 | 60 |
| 420-60 | 16,895 | 114,016 | 0.1 | 3,475 | 400 | 820 | 2,915 | 895 | 885 |
| 43. West Coast | 622,300 | 129,278 | 4.8 | 168,750 | 13,785 | 7,525 | 128,410 | 55,385 | 6,255 |
| 430 | 375 | 14,508 | 0.03 | 15 | 35 | 55 | 10 | 40 | 55 |
| 430-59 | No pop. | 4,237 | ... | ... | ... | ... | ... | ... | ... |
| 430-60 | 375 | 10,271 | 0.04 | 15 | 35 | 55 | 10 | 40 | 55 |
| 431-59 | 75,365 | 84,039 | 0.9 | 14,645 | 2,040 | 2,080 | 12,060 | 4,425 | 2,280 |
| 432-59 | 302,860 | 28,361 | 10.7 | 80,415 | 6,600 | 3,435 | 62,380 | 25,400 | 2,665 |
| 433-59 | 243,180 | 2,152 | 113.0 | 73,570 | 5,110 | 1,940 | 53,960 | 25,405 | 1,250 |
| 434-59 | 520 | 218 | 2.4 | 105 | — | 15 | — | 115 | 5 |
| 5. Gulf of Mexico Basin | 13,825 | 9,905 | 1.4 | 1,395 | 1,710 | 685 | 1,235 | 1,280 | 1,270 |
| 500-47 | 10,245 | 7,877 | 1.3 | 995 | 1,335 | 565 | 865 | 915 | 1,110 |
| 500-48 | 3,580 | 2,028 | 1.8 | 400 | 375 | 120 | 370 | 365 | 160 |

Source: Special tabulation by the Census Field, Statistics Canada.

APPENDIX 4
Farms and Farmlands Fertilized, Sprayed and Irrigated by Watershed,¹ 1971

| Watershed code and provincial code | Watershed area | Total farmlands | Croplands | Other improved farmlands | Area fertilized | Area sprayed for | | Area irrigated | Number of farms |
|--|----------------|-----------------|------------|--------------------------|-----------------|------------------|---------|----------------|-----------------|
| | | | | | | Weeds | Insects | | |
| acres | | | | | | | | | |
| 1. Atlantic Basin | 327,036,160 | 29,629,333 | 12,936,256 | 821,685 | 7,841,153 | 3,384,838 | 865,176 | 196,090 | 170,946 |
| 10. Atlantic Ocean | 84,241,920 | 278,500 | 26,654 | 7,165 | 26,267 | 2,432 | 1,920 | 164 | 1,853 |
| 101-10 | 12,371,984 | 4,138 | 1,113 | 320 | 5,511 | 196 | 301 | 35 | 165 |
| 102-10 | 1,878,786 | 12,427 | 1,877 | 398 | 6,411 | 355 | 393 | 66 | 248 |
| 103-10 | 744,817 | 20,431 | 2,131 | 539 | 3,947 | 48 | 123 | 12 | 232 |
| 104-12 | 6,188,040 | 241,504 | 21,533 | 5,908 | 10,398 | 1,833 | 1,103 | 51 | 1,208 |
| 11. Gulf of St. Lawrence | 79,789,455 | 2,577,399 | 850,892 | 74,104 | 629,360 | 129,086 | 72,073 | 7,294 | 13,461 |
| 110-24 | 35,031,907 | 32,667 | 8,173 | 2,851 | 3,280 | 191 | 159 | 168 | 220 |
| 111-10 | 13,903,167 | 25,569 | 3,553 | 767 | 7,068 | 280 | 393 | 10 | 394 |
| 112-24 | 3,448,209 | 733,789 | 258,681 | 22,126 | 99,178 | 3,902 | 1,995 | 4,603 | 3,358 |
| 113 | 15,434,088 | 876,822 | 212,964 | 26,122 | 79,638 | 17,870 | 5,287 | 1,902 | 4,306 |
| 113-12 | 1,471,218 | 286,828 | 59,468 | 6,083 | 20,703 | 8,243 | 2,324 | 236 | 1,266 |
| 113-13 | 8,593,637 | 282,134 | 63,439 | 11,412 | 28,691 | 7,958 | 2,190 | 967 | 1,464 |
| 113-24 | 5,369,233 | 307,860 | 90,057 | 8,627 | 30,244 | 1,669 | 773 | 699 | 1,576 |
| 114-11 | 1,399,040 | 774,630 | 351,384 | 19,290 | 433,871 | 106,608 | 64,040 | 541 | 4,543 |
| 115-12 | 2,512,640 | 133,922 | 16,137 | 2,948 | 6,325 | 235 | 199 | 70 | 640 |
| 12. Bay of Fundy | 6,449,464 | 846,353 | 181,693 | 19,919 | 193,429 | 32,315 | 23,155 | 1,723 | 3,599 |
| 120-12 | 3,797,582 | 666,621 | 145,821 | 14,461 | 182,169 | 28,156 | 21,014 | 1,509 | 2,894 |
| 121-13 | 2,651,882 | 179,732 | 35,872 | 5,458 | 11,260 | 4,159 | 2,141 | 214 | 705 |
| 13. Saint John River | 9,307,193 | 1,187,969 | 299,924 | 33,432 | 353,780 | 62,679 | 57,530 | 4,075 | 4,605 |
| 130-13 | 7,375,159 | 877,267 | 222,999 | 24,770 | 335,449 | 60,542 | 56,801 | 1,948 | 3,316 |
| 130-24 | 1,932,034 | 310,702 | 76,925 | 8,662 | 18,331 | 2,137 | 729 | 2,127 | 1,289 |
| 14. St. Lawrence River | 53,061,583 | 8,432,222 | 3,637,859 | 238,470 | 1,739,354 | 427,438 | 133,183 | 76,089 | 51,439 |
| 140-24 | 21,773,812 | 601,491 | 223,588 | 17,310 | 52,078 | 1,805 | 2,358 | 5,978 | 2,651 |
| 141-24 | 4,696,146 | 598,986 | 212,728 | 21,270 | 91,029 | 10,820 | 8,333 | 4,945 | 4,035 |
| 142-24 | 4,777,869 | 2,172,448 | 812,586 | 63,258 | 261,768 | 19,303 | 6,189 | 16,668 | 13,261 |
| 143-24 | 11,223,007 | 61,369 | 17,762 | 3,123 | 11,192 | 995 | 747 | 483 | 364 |
| 144-24 | 5,642,846 | 3,111,783 | 1,411,685 | 78,902 | 709,077 | 237,598 | 54,127 | 24,859 | 17,673 |
| 145-24 | 2,227,208 | 572,531 | 295,514 | 20,446 | 209,431 | 36,541 | 18,388 | 11,942 | 4,824 |
| 146-24 | 1,232,536 | 573,919 | 345,316 | 15,649 | 309,112 | 60,239 | 34,456 | 9,272 | 4,622 |
| 147 | 1,488,159 | 739,695 | 318,680 | 18,512 | 95,667 | 60,137 | 8,585 | 1,942 | 4,009 |
| 147-24 | 252,543 | 147,728 | 96,530 | 2,575 | 51,763 | 17,227 | 3,307 | 1,339 | 1,030 |
| 147-35 | 1,235,616 | 591,967 | 222,150 | 15,937 | 43,904 | 42,910 | 5,278 | 603 | 2,979 |
| 15. Ottawa River | 37,104,976 | 3,898,957 | 1,346,801 | 99,099 | 328,242 | 190,822 | 28,115 | 12,434 | 17,035 |
| 150 | 13,975,814 | 2,144,106 | 823,057 | 57,640 | 234,282 | 150,384 | 22,255 | 8,245 | 10,508 |
| 150-24 | 11,607,867 | 771,656 | 218,109 | 25,662 | 42,128 | 13,000 | 4,159 | 4,819 | 3,218 |
| 150-35 | 2,367,947 | 1,372,450 | 604,948 | 31,978 | 192,154 | 137,384 | 18,096 | 3,426 | 7,290 |
| 151 | 23,129,162 | 1,754,851 | 523,744 | 41,459 | 93,960 | 40,438 | 5,860 | 4,189 | 6,527 |
| 151-24 | 12,770,935 | 502,018 | 171,827 | 13,319 | 24,432 | 4,802 | 1,350 | 3,244 | 2,004 |
| 151-35 | 10,358,227 | 1,252,833 | 351,917 | 28,140 | 69,528 | 35,636 | 4,510 | 945 | 4,523 |
| 16. Lake Ontario | 7,854,849 | 3,109,607 | 1,377,932 | 93,494 | 819,788 | 373,713 | 101,712 | 13,720 | 21,012 |
| 160-35 | 1,998,782 | 813,488 | 285,557 | 21,352 | 90,087 | 46,557 | 7,583 | 1,881 | 3,767 |
| 161-35 | 3,326,509 | 1,121,242 | 404,280 | 27,464 | 138,008 | 102,495 | 12,396 | 1,827 | 5,808 |
| 162-35 | 310,247 | 240,523 | 107,318 | 7,318 | 82,341 | 41,121 | 10,164 | 2,162 | 1,681 |
| 163-35 | 770,048 | 308,710 | 194,846 | 10,678 | 94,078 | 77,811 | 10,579 | 1,600 | 2,425 |
| 164-35 | 637,567 | 262,459 | 145,275 | 10,421 | 105,073 | 40,501 | 13,448 | 3,707 | 2,375 |
| 165-35 | 811,696 | 363,185 | 240,656 | 16,261 | 310,201 | 65,228 | 47,542 | 2,543 | 4,956 |
| 17. Lake Erie and Lake St. Clair | 6,012,404 | 4,477,288 | 3,094,351 | 136,733 | 2,543,659 | 1,459,106 | 332,163 | 70,065 | 32,544 |
| 170-35 | 1,919,222 | 1,283,300 | 825,273 | 38,658 | 483,903 | 353,023 | 48,283 | 9,464 | 9,232 |
| 171-35 | 1,909,719 | 1,261,273 | 902,751 | 50,551 | 1,121,852 | 392,041 | 151,252 | 55,122 | 10,493 |
| 172-35 | 1,483,244 | 1,210,784 | 879,588 | 31,240 | 613,300 | 463,678 | 84,688 | 3,684 | 8,316 |
| 173-35 | 700,219 | 721,931 | 486,739 | 16,284 | 324,604 | 250,364 | 47,940 | 1,795 | 4,503 |
| 18. Lake Huron | 23,391,109 | 4,710,028 | 2,085,649 | 115,708 | 1,192,195 | 706,101 | 114,771 | 10,405 | 24,937 |
| 180-35 | 4,013,392 | 2,832,774 | 1,410,732 | 64,059 | 762,093 | 535,081 | 72,417 | 2,076 | 15,784 |
| 181-35 | 5,561,468 | 1,238,556 | 533,983 | 35,519 | 395,625 | 165,904 | 41,312 | 6,850 | 7,287 |
| 182-35 | 13,816,249 | 638,698 | 140,934 | 16,130 | 34,477 | 5,116 | 1,042 | 1,479 | 1,866 |
| 19. Lake Superior: | | | | | | | | | |
| 190-35 | 19,822,068 | 111,010 | 34,501 | 3,561 | 15,079 | 1,146 | 554 | 121 | 461 |

See footnote(s) at end of table.

Farms and Farmlands Fertilized, Sprayed and Irrigated by Watershed,¹ 1971 — Concluded

| Watershed code and provincial code | Watershed area | Total farmlands | Croplands | Other improved farmlands | Area fertilized | Area sprayed for | | Area irrigated | Number of farms |
|--|----------------|-----------------|------------|--------------------------|-----------------|------------------|-----------|----------------|-----------------|
| | | | | | | Weeds | Insects | | |
| | | | | | acres | | | | |
| 2. Hudson Bay and Ungava Basin | 854,815,788 | 119,569,487 | 49,860,717 | 1,340,601 | 11,505,399 | 16,861,516 | 1,245,870 | 589,779 | 160,338 |
| 21. South and West Hudson Bay . . . | 441,554,304 | 2,989,889 | 892,157 | 50,449 | 172,429 | 99,987 | 8,633 | 2,155 | 4,722 |
| 210 | 215,268,098 | 393,231 | 122,511 | 19,117 | 20,792 | 979 | 386 | 1,824 | 1,423 |
| 210-24 | 42,841,309 | 292,725 | 94,434 | 15,090 | 12,578 | 70 | 308 | 1,719 | 1,082 |
| 210-35 | 145,132,388 | 100,506 | 28,077 | 4,027 | 8,214 | 909 | 78 | 105 | 341 |
| 211 | 226,286,206 | 2,596,658 | 769,646 | 31,332 | 151,637 | 99,008 | 8,247 | 331 | 3,299 |
| 211-46 | 48,783,262 | 4 | — | 4 | — | — | — | — | 2 |
| 211-47 | 40,939,626 | 1,558,734 | 449,444 | 16,027 | 105,031 | 72,338 | 5,783 | 50 | 1,708 |
| 211-48 | 4,541,219 | 1,037,920 | 320,202 | 15,301 | 46,606 | 26,670 | 2,464 | 281 | 1,589 |
| 23. Lake Winnipeg | 69,409,938 | 14,221,298 | 6,680,401 | 229,881 | 2,546,244 | 2,892,044 | 244,206 | 4,790 | 28,255 |
| 230 | 45,430,309 | 1,433,630 | 563,130 | 29,414 | 131,954 | 191,192 | 9,668 | 124 | 3,568 |
| 230-35 | 28,155,249 | 236,096 | 56,162 | 4,641 | 16,308 | 1,214 | 68 | 82 | 632 |
| 230-46 | 17,275,060 | 1,197,534 | 506,968 | 24,773 | 115,646 | 189,978 | 9,600 | 42 | 2,936 |
| 231-46 | 6,398,116 | 4,967,276 | 3,199,320 | 91,388 | 1,277,828 | 1,539,001 | 131,625 | 3,459 | 12,171 |
| 232 | 17,581,513 | 7,820,392 | 2,917,951 | 109,079 | 1,136,462 | 1,161,851 | 102,913 | 1,207 | 12,516 |
| 232-46 | 12,988,873 | 5,943,943 | 2,138,754 | 83,442 | 861,184 | 942,861 | 76,995 | 1,207 | 9,211 |
| 232-47 | 4,592,640 | 1,876,449 | 779,197 | 25,637 | 275,278 | 218,990 | 25,918 | — | 3,305 |
| 24. Assiniboine River | 39,852,589 | 35,927,274 | 16,561,770 | 361,902 | 1,959,204 | 5,276,335 | 306,711 | 19,310 | 48,090 |
| 240 | 22,422,934 | 19,366,768 | 9,116,711 | 231,837 | 1,556,996 | 3,230,605 | 197,129 | 5,527 | 28,655 |
| 240-46 | 8,317,043 | 6,814,399 | 3,243,612 | 95,195 | 866,938 | 1,519,408 | 93,498 | 2,619 | 10,535 |
| 240-47 | 14,105,891 | 12,552,369 | 5,873,099 | 136,642 | 690,058 | 1,711,197 | 103,631 | 2,908 | 18,120 |
| 241-47 | 17,408,655 | 16,560,506 | 7,445,059 | 130,065 | 402,208 | 2,045,730 | 109,582 | 13,783 | 19,435 |
| 25. Saskatchewan River | 100,700,497 | 66,431,026 | 25,726,389 | 698,369 | 6,827,522 | 8,593,150 | 686,320 | 563,524 | 79,271 |
| 250 | 18,850,456 | 3,381,489 | 1,774,617 | 42,725 | 763,328 | 554,840 | 85,367 | 546 | 5,836 |
| 250-46 | 4,502,397 | 85,103 | 33,820 | 1,016 | 13,526 | 2,610 | 1,057 | 3 | 126 |
| 250-47 | 14,348,059 | 3,296,386 | 1,740,797 | 41,709 | 749,802 | 552,230 | 84,310 | 543 | 5,710 |
| 251-48 | 6,893,634 | 1,383,012 | 617,410 | 30,110 | 208,141 | 156,147 | 12,036 | 722 | 3,697 |
| 252 | 30,944,133 | 26,310,642 | 10,695,814 | 328,000 | 2,984,712 | 3,127,749 | 235,227 | 5,441 | 34,666 |
| 252-47 | 14,596,309 | 12,247,663 | 4,980,803 | 109,454 | 1,044,759 | 1,199,977 | 108,611 | 1,777 | 13,637 |
| 252-48 | 16,347,824 | 14,062,979 | 5,715,011 | 218,546 | 1,939,953 | 1,927,772 | 126,616 | 3,664 | 21,029 |
| 253 | 37,842,649 | 32,070,757 | 11,536,761 | 265,305 | 2,439,404 | 4,376,713 | 320,510 | 430,469 | 31,678 |
| 253-47 | 14,240,743 | 12,767,509 | 5,152,475 | 92,985 | 435,551 | 1,901,128 | 145,104 | 30,805 | 13,103 |
| 253-48 | 23,601,906 | 19,303,248 | 6,384,286 | 172,320 | 2,003,853 | 2,475,585 | 175,406 | 399,664 | 18,575 |
| 254-48 | 6,169,625 | 3,285,126 | 1,101,787 | 32,229 | 431,937 | 377,701 | 33,180 | 126,346 | 3,394 |
| 3. Arctic Basin | .. | 10,271,496 | 4,221,390 | 164,613 | 1,239,332 | 500,677 | 48,643 | 1,588 | 15,672 |
| 31. Athabasca River: | | | | | | | | | |
| 310-48 | 34,772,456 | 3,114,519 | 1,242,174 | 59,328 | 316,953 | 206,640 | 12,799 | 410 | 6,042 |
| 32. Peace River | 77,281,858 | 7,156,977 | 2,979,216 | 105,285 | 922,379 | 294,037 | 35,844 | 1,178 | 9,630 |
| 320-48 | 46,568,674 | 5,483,964 | 2,459,417 | 79,579 | 796,004 | 220,734 | 32,453 | 865 | 7,882 |
| 320-59 | 30,713,184 | 1,673,013 | 519,799 | 25,706 | 126,375 | 73,303 | 3,391 | 313 | 1,748 |
| 4. Pacific Basin | 244,296,661 | 4,150,218 | 572,794 | 66,268 | 520,339 | 63,129 | 72,369 | 220,674 | 16,652 |
| 40. Columbia River | 25,398,719 | 903,224 | 157,405 | 11,527 | 215,023 | 29,284 | 36,522 | 78,806 | 4,854 |
| 400-59 | 21,459,293 | 392,271 | 70,665 | 5,234 | 37,456 | 11,410 | 5,975 | 24,353 | 1,432 |
| 401-59 | 2,087,641 | 287,744 | 71,680 | 5,016 | 163,758 | 16,626 | 27,701 | 44,292 | 3,113 |
| 402-59 | 1,851,785 | 223,209 | 15,060 | 1,277 | 13,809 | 1,248 | 2,846 | 10,161 | 309 |
| 41. Fraser River | 57,403,802 | 2,869,374 | 357,238 | 44,027 | 260,336 | 30,793 | 33,155 | 125,890 | 9,598 |
| 410-59 | 41,996,419 | 1,275,177 | 157,396 | 22,645 | 66,459 | 6,397 | 9,527 | 42,480 | 2,384 |
| 411-59 | 13,878,133 | 1,390,080 | 109,989 | 9,399 | 27,073 | 3,972 | 1,262 | 64,851 | 1,593 |
| 412-59 | 1,529,250 | 204,117 | 89,853 | 11,983 | 166,804 | 20,424 | 22,366 | 18,559 | 5,621 |
| 43. West Coast | 82,737,890 | 377,620 | 58,151 | 10,714 | 44,980 | 3,052 | 2,692 | 15,978 | 2,200 |
| 431-59 | 53,785,002 | 229,477 | 27,669 | 2,869 | 11,658 | 397 | 90 | 5,328 | 335 |
| 432-59 | 18,151,113 | 80,446 | 14,933 | 3,078 | 11,434 | 906 | 480 | 5,316 | 762 |
| 433-59 | 1,377,239 | 67,697 | 15,549 | 4,767 | 21,888 | 1,749 | 2,122 | 5,334 | 1,103 |
| 5. Gulf of Mexico Basin | 6,339,199 | 5,998,071 | 1,166,286 | 23,485 | 38,310 | 368,830 | 25,218 | 32,937 | 2,431 |
| 500-47 | 5,041,029 | 4,186,322 | 914,029 | 16,768 | 18,071 | 305,653 | 20,650 | 27,568 | 1,937 |
| 500-48 | 1,298,170 | 1,811,749 | 252,257 | 6,717 | 20,239 | 63,177 | 4,568 | 5,369 | 494 |

¹ Watersheds without farms are excluded; the 18 farms in the Yukon and Northwest Territories are also excluded.

Source: Special tabulation by the Census Field, Statistics Canada.

APPENDIX 5

Livestock on Census Farms by Watershed, 1971

| Watershed code and provincial code | Cattle | Pigs | Sheep | All poultry | Other livestock |
|--|-----------|-----------|---------|-------------|-----------------|
| 1. Atlantic Basin | 5,149,330 | 3,986,361 | 364,719 | 59,870,516 | 1,260,412 |
| 10. Atlantic Ocean | 21,610 | 22,495 | 8,805 | 1,106,003 | 65,321 |
| 101-10 | 564 | 1,327 | 1,479 | 85,099 | 211 |
| 102-10 | 1,343 | 2,533 | 1,412 | 244,856 | 306 |
| 103-10 | 2,925 | 9,764 | 387 | 299,158 | 178 |
| 104-12 | 16,778 | 8,871 | 5,527 | 476,890 | 64,626 |
| 11. Gulf of St. Lawrence | 306,597 | 181,590 | 60,541 | 1,729,197 | 45,761 |
| 110-24 | 3,567 | 1,085 | 323 | 26,371 | 149 |
| 111-10 | 2,295 | 1,015 | 6,106 | 179,806 | 6,188 |
| 112-24 | 92,674 | 41,577 | 15,605 | 194,258 | 3,684 |
| 113 | 91,336 | 35,462 | 23,641 | 828,497 | 6,233 |
| 113-12 | 27,897 | 12,898 | 9,742 | 215,590 | 1,939 |
| 113-13 | 26,514 | 16,046 | 4,569 | 459,501 | 2,190 |
| 113-24 | 36,925 | 6,518 | 9,330 | 153,406 | 2,104 |
| 114-11 | 106,062 | 100,936 | 8,484 | 268,642 | 11,075 |
| 115-12 | 10,663 | 1,515 | 6,382 | 231,623 | 18,432 |
| 12. Bay of Fundy | 95,178 | 64,211 | 15,701 | 2,394,656 | 58,181 |
| 120-12 | 75,582 | 56,481 | 14,186 | 2,131,710 | 53,216 |
| 121-13 | 19,596 | 7,730 | 1,515 | 262,946 | 4,965 |
| 13. Saint John River | 98,481 | 41,674 | 17,568 | 1,167,376 | 11,905 |
| 130-13 | 66,576 | 32,554 | 11,172 | 1,039,535 | 10,028 |
| 130-24 | 31,905 | 9,120 | 6,396 | 127,841 | 1,877 |
| 14. St. Lawrence River | 1,526,327 | 1,306,245 | 46,791 | 22,449,139 | 220,188 |
| 140-24 | 106,758 | 27,505 | 8,668 | 504,909 | 13,664 |
| 141-24 | 93,655 | 61,334 | 2,604 | 1,196,715 | 9,660 |
| 142-24 | 400,420 | 498,122 | 9,548 | 3,612,091 | 37,012 |
| 143-24 | 6,635 | 1,915 | 601 | 73,939 | 563 |
| 144-24 | 570,073 | 450,643 | 13,774 | 8,929,534 | 71,441 |
| 145-24 | 106,308 | 204,706 | 4,078 | 6,290,752 | 48,626 |
| 146-24 | 97,555 | 38,785 | 2,923 | 771,464 | 20,183 |
| 147 | 144,923 | 23,235 | 4,595 | 1,069,735 | 19,039 |
| 147-24 | 35,045 | 3,802 | 59 | 138,657 | 4,950 |
| 147-35 | 109,878 | 19,433 | 4,536 | 931,078 | 14,089 |
| 15. Ottawa River | 624,080 | 123,054 | 38,287 | 1,987,952 | 56,934 |
| 150 | 380,246 | 83,138 | 18,052 | 1,571,146 | 36,537 |
| 150-24 | 93,887 | 24,806 | 6,198 | 470,669 | 16,362 |
| 150-35 | 286,359 | 58,332 | 11,854 | 1,100,477 | 20,175 |
| 151 | 243,834 | 39,916 | 20,235 | 416,806 | 20,397 |
| 151-24 | 69,773 | 8,831 | 3,306 | 43,859 | 2,913 |
| 151-35 | 174,061 | 31,085 | 16,929 | 372,947 | 17,484 |
| 16. Lake Ontario | 561,697 | 313,947 | 47,590 | 8,936,962 | 185,804 |
| 160-35 | 120,085 | 34,927 | 8,132 | 681,709 | 9,473 |
| 161-35 | 219,607 | 83,919 | 14,484 | 1,192,069 | 25,998 |
| 162-35 | 53,212 | 19,530 | 4,460 | 974,978 | 43,851 |
| 163-35 | 62,980 | 52,837 | 9,771 | 619,248 | 28,285 |
| 164-35 | 51,301 | 46,198 | 6,574 | 1,637,020 | 27,733 |
| 165-35 | 54,512 | 79,536 | 4,169 | 3,831,938 | 50,464 |
| 17. Lake Erie and Lake St. Clair | 831,644 | 1,163,768 | 48,036 | 10,923,571 | 411,722 |
| 170-35 | 331,407 | 468,194 | 20,116 | 4,984,045 | 192,120 |
| 171-35 | 129,697 | 185,775 | 6,618 | 1,754,071 | 78,666 |
| 172-35 | 261,825 | 368,814 | 9,436 | 2,881,231 | 122,790 |
| 173-35 | 108,715 | 140,985 | 11,866 | 1,304,224 | 18,146 |
| 18. Lake Huron | 1,071,180 | 766,397 | 80,983 | 9,034,515 | 199,937 |
| 180-35 | 750,958 | 599,314 | 40,875 | 6,826,978 | 103,331 |
| 181-35 | 256,014 | 158,765 | 28,734 | 2,100,899 | 87,453 |
| 182-35 | 64,208 | 8,318 | 11,374 | 106,638 | 9,153 |
| 19. Lake Superior: | | | | | |
| 190-35 | 12,536 | 2,980 | 417 | 141,145 | 4,659 |

Livestock on Census Farms by Watershed, 1971 — Concluded

| Watershed code and provincial code | Cattle | Pigs | Sheep | All poultry | Other livestock |
|---|-----------|-----------|---------|-------------|-----------------|
| 2. Hudson Bay and Ungava Basin. | 6,950,511 | 3,691,569 | 394,290 | 18,807,380 | 563,855 |
| 21. South and West Hudson Bay | 209,933 | 76,675 | 12,350 | 306,531 | 28,824 |
| 210 | 44,774 | 5,433 | 6,731 | 92,728 | 3,714 |
| 210-24 | 34,407 | 4,239 | 4,977 | 51,222 | 1,800 |
| 210-35 | 10,367 | 1,194 | 1,754 | 41,506 | 1,914 |
| 211 | 165,159 | 71,242 | 5,619 | 213,803 | 25,100 |
| 211-46 | — | — | — | — | 2,529 |
| 211-47 | 94,906 | 25,772 | 2,036 | 92,485 | 15,793 |
| 211-48 | 70,253 | 45,470 | 3,583 | 121,318 | 6,778 |
| 23. Lake Winnipeg | 803,641 | 827,984 | 35,384 | 5,958,321 | 149,543 |
| 230 | 99,456 | 60,470 | 7,267 | 579,378 | 62,555 |
| 230-35 | 24,127 | 1,529 | 4,172 | 27,627 | 9,269 |
| 230-46 | 75,329 | 58,941 | 3,095 | 551,751 | 53,286 |
| 231-46 | 268,641 | 501,825 | 9,979 | 4,395,647 | 41,944 |
| 232 | 435,544 | 265,689 | 18,138 | 983,296 | 45,044 |
| 232-46 | 370,365 | 223,623 | 14,800 | 813,497 | 39,122 |
| 232-47 | 65,179 | 42,066 | 3,338 | 169,799 | 5,922 |
| 24. Assiniboine River | 1,618,125 | 720,653 | 72,576 | 3,572,648 | 103,112 |
| 240 | 1,011,104 | 489,685 | 45,467 | 2,202,631 | 74,069 |
| 240-46 | 419,582 | 285,262 | 14,153 | 910,641 | 30,529 |
| 240-47 | 591,522 | 204,423 | 31,314 | 1,291,990 | 43,540 |
| 241-47 | 607,021 | 230,968 | 27,109 | 1,370,017 | 29,043 |
| 25. Saskatchewan River | 4,318,812 | 2,066,257 | 274,070 | 8,969,880 | 282,386 |
| 250 | 94,890 | 171,721 | 4,621 | 243,936 | 25,775 |
| 250-46 | 4,158 | 920 | 473 | 6,279 | 1,438 |
| 250-47 | 90,732 | 170,801 | 4,148 | 237,657 | 24,337 |
| 251-48 | 142,328 | 86,162 | 8,757 | 453,633 | 27,307 |
| 252 | 1,675,048 | 909,136 | 65,730 | 4,007,012 | 90,477 |
| 252-47 | 568,929 | 224,313 | 29,026 | 900,414 | 16,494 |
| 252-48 | 1,106,119 | 684,823 | 36,704 | 3,106,598 | 73,983 |
| 253 | 2,061,298 | 814,639 | 171,095 | 3,344,503 | 96,499 |
| 253-47 | 446,209 | 227,008 | 41,526 | 958,669 | 18,530 |
| 253-48 | 1,615,089 | 587,631 | 129,569 | 2,385,834 | 77,969 |
| 254-48 | 345,248 | 84,599 | 23,867 | 920,796 | 42,328 |
| 3. Arctic Basin | 372,832 | 331,418 | 40,314 | 946,691 | 150,464 |
| 31. Athabasca River: | | | | | |
| 310-48 | 232,513 | 188,977 | 19,074 | 486,265 | 98,928 |
| 32. Peace River | 140,319 | 142,441 | 21,240 | 460,426 | 51,536 |
| 320-48 | 110,914 | 129,682 | 15,568 | 367,795 | 38,264 |
| 320-59 | 29,405 | 12,759 | 5,672 | 92,631 | 13,272 |
| 4. Pacific Basin | 543,766 | 65,862 | 47,440 | 7,768,857 | 333,545 |
| 40. Columbia River. | 100,306 | 10,631 | 5,578 | 229,684 | 20,650 |
| 400-59 | 52,885 | 4,116 | 3,038 | 91,707 | 6,537 |
| 401-59 | 31,529 | 6,354 | 1,907 | 120,117 | 13,131 |
| 402-59 | 15,892 | 161 | 633 | 17,860 | 982 |
| 41. Fraser River. | 393,781 | 49,794 | 28,805 | 6,792,573 | 281,375 |
| 410-59 | 138,032 | 7,571 | 10,753 | 427,645 | 30,660 |
| 411-59 | 145,478 | 7,064 | 8,258 | 176,424 | 17,349 |
| 412-59 | 110,271 | 35,159 | 9,794 | 6,188,504 | 233,366 |
| 43. West Coast | 49,679 | 5,437 | 13,057 | 746,600 | 31,520 |
| 431-59 | 20,171 | 348 | 1,301 | 60,535 | 1,688 |
| 432-59 | 15,158 | 1,948 | 2,559 | 87,362 | 4,045 |
| 433-59 | 14,350 | 3,141 | 9,197 | 598,703 | 25,787 |
| 5. Gulf of Mexico Basin | 257,804 | 27,809 | 13,901 | 141,257 | 5,321 |
| 500-47 | 180,067 | 19,916 | 6,097 | 60,353 | 3,964 |
| 500-48 | 77,737 | 7,893 | 7,804 | 80,904 | 1,357 |

Source: Special tabulation by the Census Field, Statistics Canada.

APPENDIX 6
Industrial Activity "Stressor Type" by Watershed, 1973

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|----------------------------------|----------------|--------------|---------------|--------------|-----------------------|--------------|
| | number | per cent | number | per cent | 1012 B.t.u.'s | per cent |
| 100: | | | | | | |
| High | — | — | — | — | — | — |
| Medium | 1 | 25.0 | 30 | 81.1 | x | x |
| Low. | 3 | 75.0 | 7 | 18.9 | x | x |
| Total | 4 | 100.0 | 37 | 100.0 | 0.1 | 100.0 |
| 101: | | | | | | |
| High | 1 | 1.6 | 960 | 56.2 | x | x |
| Medium | 13 | 20.6 | 569 | 33.3 | 0.1 | 3.6 |
| Low. | 49 | 77.8 | 179 | 10.5 | x | x |
| Total | 63 | 100.0 | 1,708 | 100.0 | 2.9 | 100.0 |
| 102: | | | | | | |
| High | 2 | 5.6 | 117 | 8.1 | x | x |
| Medium | 16 | 44.4 | 1,159 | 80.7 | 0.1 | 36.0 |
| Low. | 18 | 50.0 | 161 | 11.2 | x | x |
| Total | 36 | 100.0 | 1,437 | 100.0 | 0.4 | 100.0 |
| 103: | | | | | | |
| High | 3 | 3.9 | 118 | 4.7 | 0.1 | 11.4 |
| Medium | 22 | 28.6 | 1,140 | 45.4 | 0.4 | 60.4 |
| Low. | 52 | 67.5 | 1,252 | 49.9 | 0.2 | 28.1 |
| Total | 77 | 100.0 | 2,510 | 100.0 | 0.6 | 100.0 |
| 104: | | | | | | |
| High | 10 | 2.7 | 1,157 | 10.6 | 2.7 | 60.0 |
| Medium | 98 | 26.3 | 4,078 | 37.5 | 1.1 | 24.4 |
| Low. | 264 | 71.0 | 5,656 | 51.9 | 0.7 | 15.6 |
| Total | 372 | 100.0 | 10,891 | 100.0 | 4.5 | 100.0 |
| 110: | | | | | | |
| High | 5 | 6.7 | 2,266 | 71.5 | 4.3 | 95.6 |
| Medium | 23 | 30.7 | 525 | 16.6 | 0.2 | 4.4 |
| Low. | 47 | 62.6 | 376 | 11.9 | 0.1 | 1.2 |
| Total | 75 | 100.0 | 3,167 | 100.0 | 4.5 | 100.0 |
| 111: | | | | | | |
| High | 6 | 9.2 | 2,075 | 35.7 | 8.9 | 89.0 |
| Medium | 32 | 49.2 | 3,157 | 54.4 | 0.9 | 9.0 |
| Low | 27 | 41.6 | 568 | 9.9 | 0.2 | 2.0 |
| Total | 65 | 100.0 | 5,800 | 100.0 | 10.0 | 100.0 |
| 112: | | | | | | |
| High | 3 | 2.1 | 184 | 9.0 | 0.9 | 64.3 |
| Medium | 19 | 13.6 | 379 | 18.4 | 0.3 | 21.4 |
| Low. | 118 | 84.3 | 1,494 | 72.6 | 0.2 | 14.3 |
| Total | 140 | 100.0 | 2,057 | 100.0 | 1.4 | 100.0 |
| 113: | | | | | | |
| High | 22 | 6.2 | 4,102 | 30.9 | 25.4 | 89.4 |
| Medium | 112 | 31.5 | 4,208 | 31.6 | 1.2 | 4.2 |
| Low. | 222 | 62.3 | 4,986 | 37.5 | 1.8 | 6.4 |
| Total | 356 | 100.0 | 13,296 | 100.0 | 28.4 | 100.0 |
| 114: | | | | | | |
| High | — | — | — | — | — | — |
| Medium | 72 | 55.0 | 1,455 | 76.7 | 0.4 | 93.1 |
| Low. | 59 | 45.0 | 443 | 23.3 | — | 6.9 |
| Total | 131 | 100.0 | 1,898 | 100.0 | 0.4 | 100.0 |

Industrial Activity "Stressor Type" by Watershed, 1973 - Continued

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|----------------------------------|----------------|----------|---------|----------|---------------------------|----------|
| | number | per cent | number | per cent | 10 ¹² B.t.u.'s | per cent |
| 115: | | | | | | |
| High | 9 | 9.8 | 4,036 | 61.7 | 11.6 | 96.7 |
| Medium | 25 | 27.2 | 1,308 | 20.0 | 0.3 | 2.8 |
| Low | 58 | 63.0 | 1,194 | 18.3 | 0.1 | 0.5 |
| Total | 92 | 100.0 | 6,538 | 100.0 | 12.0 | 100.0 |
| 120: | | | | | | |
| High | 5 | 2.3 | 431 | 6.7 | 1.1 | 36.7 |
| Medium | 59 | 27.6 | 1,982 | 30.8 | 0.8 | 26.6 |
| Low | 150 | 70.1 | 4,021 | 62.5 | 1.1 | 36.7 |
| Total | 214 | 100.0 | 6,434 | 100.0 | 3.0 | 100.0 |
| 121: | | | | | | |
| High | 4 | 3.1 | 263 | 5.8 | 1.8 | 56.3 |
| Medium | 43 | 33.3 | 1,725 | 37.8 | 0.5 | 15.6 |
| Low | 82 | 63.6 | 2,576 | 56.4 | 0.9 | 28.1 |
| Total | 129 | 100.0 | 4,564 | 100.0 | 3.2 | 100.0 |
| 130: | | | | | | |
| High | 11 | 3.4 | 2,139 | 16.2 | 13.3 | 75.6 |
| Medium | 53 | 16.4 | 2,108 | 16.0 | 1.6 | 9.1 |
| Low | 260 | 80.2 | 8,934 | 67.8 | 2.7 | 15.3 |
| Total | 324 | 100.0 | 13,181 | 100.0 | 17.6 | 100.0 |
| 140: | | | | | | |
| High | 13 | 5.9 | 7,953 | 66.6 | 14.2 | 90.4 |
| Medium | 41 | 18.6 | 693 | 5.8 | 0.7 | 4.6 |
| Low | 166 | 75.5 | 3,289 | 27.6 | 0.8 | 5.0 |
| Total | 220 | 100.0 | 11,935 | 100.0 | 15.7 | 100.0 |
| 141: | | | | | | |
| High | 17 | 2.5 | 4,440 | 21.5 | 17.1 | 84.2 |
| Medium | 111 | 16.3 | 4,001 | 19.4 | 2.0 | 9.9 |
| Low | 554 | 81.2 | 12,174 | 59.1 | 1.2 | 5.9 |
| Total | 682 | 100.0 | 20,615 | 100.0 | 20.3 | 100.0 |
| 142: | | | | | | |
| High | 11 | 1.4 | 531 | 2.2 | 0.6 | 14.0 |
| Medium | 185 | 23.5 | 4,191 | 17.3 | 2.0 | 46.5 |
| Low | 592 | 75.1 | 19,503 | 80.5 | 1.7 | 39.5 |
| Total | 788 | 100.0 | 24,225 | 100.0 | 4.3 | 100.0 |
| 143: | | | | | | |
| High | 16 | 8.0 | 5,485 | 40.8 | 15.1 | 87.7 |
| Medium | 38 | 19.0 | 3,344 | 24.9 | 1.8 | 10.2 |
| Low | 146 | 73.0 | 4,619 | 34.3 | 0.4 | 2.1 |
| Total | 200 | 100.0 | 13,448 | 100.0 | 17.3 | 100.0 |
| 144: | | | | | | |
| High | 34 | 2.3 | 5,541 | 7.7 | 22.2 | 54.4 |
| Medium | 371 | 24.9 | 20,125 | 28.1 | 12.6 | 30.9 |
| Low | 1,087 | 72.8 | 45,971 | 64.2 | 6.0 | 14.7 |
| Total | 1,492 | 100.0 | 71,637 | 100.0 | 40.8 | 100.0 |
| 145: | | | | | | |
| High | 8 | 2.1 | 1,333 | 11.8 | 5.6 | 67.5 |
| Medium | 82 | 21.5 | 2,962 | 26.3 | 1.9 | 22.9 |
| Low | 291 | 76.4 | 6,991 | 61.9 | 0.8 | 9.6 |
| Total | 381 | 100.0 | 11,286 | 100.0 | 8.3 | 100.0 |

Industrial Activity "Stressor Type" by Watershed, 1973 - Continued

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|----------------------------------|----------------|----------|---------|----------|-----------------------|----------|
| | number | per cent | number | per cent | 1012 B.t.u.'s | per cent |
| 146: | | | | | | |
| High | 44 | 0.8 | 6,060 | 3.0 | 19.7 | 31.8 |
| Medium | 763 | 14.5 | 33,518 | 16.5 | 18.2 | 29.4 |
| Low | 4,440 | 84.6 | 164,066 | 80.5 | 24.0 | 38.8 |
| Total | 5,247 | 100.0 | 203,644 | 100.0 | 61.9 | 100.0 |
| 147: | | | | | | |
| High | 24 | 7.1 | 3,274 | 15.6 | 6.1 | 31.4 |
| Medium | 91 | 27.1 | 8,638 | 41.2 | 10.2 | 52.6 |
| Low | 221 | 65.8 | 9,058 | 43.2 | 3.1 | 16.0 |
| Total | 336 | 100.0 | 20,970 | 100.0 | 19.4 | 100.0 |
| 150: | | | | | | |
| High | 27 | 3.8 | 6,500 | 24.2 | 21.5 | 81.5 |
| Medium | 150 | 20.9 | 5,388 | 20.1 | 2.2 | 8.3 |
| Low | 541 | 75.3 | 14,936 | 55.7 | 2.7 | 10.2 |
| Total | 718 | 100.0 | 26,824 | 100.0 | 26.4 | 100.0 |
| 151: | | | | | | |
| High | 6 | 1.7 | 1,374 | 11.5 | 8.6 | 80.4 |
| Medium | 64 | 18.7 | 1,763 | 14.7 | 0.8 | 7.5 |
| Low | 273 | 79.6 | 8,818 | 73.8 | 1.3 | 12.1 |
| Total | 343 | 100.0 | 11,955 | 100.0 | 10.7 | 100.0 |
| 160: | | | | | | |
| High | 7 | 4.8 | 711 | 8.9 | 7.8 | 75.7 |
| Medium | 49 | 33.6 | 2,402 | 30.0 | 2.0 | 19.4 |
| Low | 90 | 61.6 | 4,873 | 61.1 | 0.5 | 4.9 |
| Total | 146 | 100.0 | 7,986 | 100.0 | 10.3 | 100.0 |
| 161: | | | | | | |
| High | 6 | 2.2 | 413 | 3.5 | 0.8 | 21.8 |
| Medium | 68 | 24.7 | 1,802 | 15.5 | 0.8 | 23.1 |
| Low | 201 | 73.1 | 9,420 | 81.0 | 2.0 | 55.1 |
| Total | 275 | 100.0 | 11,635 | 100.0 | 3.6 | 100.0 |
| 162: | | | | | | |
| High | 7 | 3.3 | 949 | 4.5 | 2.9 | 30.2 |
| Medium | 36 | 17.0 | 2,643 | 12.4 | 1.1 | 11.5 |
| Low | 169 | 79.7 | 17,681 | 83.1 | 5.6 | 58.3 |
| Total | 212 | 100.0 | 21,273 | 100.0 | 9.6 | 100.0 |
| 163: | | | | | | |
| High | 39 | 0.7 | 3,165 | 1.4 | 12.1 | 10.9 |
| Medium | 937 | 16.5 | 42,698 | 19.3 | 21.6 | 19.4 |
| Low | 4,687 | 82.8 | 175,637 | 79.3 | 77.6 | 69.7 |
| Total | 5,663 | 100.0 | 221,500 | 100.0 | 111.3 | 100.0 |
| 164: | | | | | | |
| High | 23 | 2.8 | 21,805 | 33.2 | 29.3 | 60.8 |
| Medium | 175 | 21.0 | 10,577 | 16.1 | 6.6 | 13.5 |
| Low | 636 | 76.2 | 33,333 | 50.7 | 12.4 | 25.7 |
| Total | 834 | 100.0 | 65,715 | 100.0 | 48.3 | 100.0 |
| 165: | | | | | | |
| High | 25 | 4.5 | 7,362 | 20.8 | 15.3 | 56.7 |
| Medium | 127 | 23.1 | 5,962 | 16.9 | 3.3 | 12.1 |
| Low | 398 | 72.4 | 22,016 | 62.3 | 8.4 | 31.2 |
| Total | 550 | 100.0 | 35,340 | 100.0 | 27.0 | 100.0 |

Industrial Activity "Stressor Type" by Watershed, 1973 - Continued

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|----------------------------------|----------------|----------|---------|----------|-----------------------|----------|
| | number | per cent | number | per cent | 1012 B.t.u.'s | per cent |
| 170: | | | | | | |
| High | 18 | 1.7 | 860 | 1.3 | 2.2 | 12.7 |
| Medium | 261 | 25.0 | 16,194 | 25.4 | 7.5 | 43.1 |
| Low. | 767 | 73.3 | 46,820 | 73.3 | 7.7 | 44.2 |
| Total | 1,046 | 100.0 | 63,874 | 100.0 | 17.5 | 100.0 |
| 171: | | | | | | |
| High | 12 | 1.8 | 597 | 1.4 | 5.4 | 31.0 |
| Medium | 147 | 21.9 | 8,415 | 19.1 | 4.6 | 26.5 |
| Low. | 512 | 76.3 | 35,015 | 79.5 | 7.4 | 42.5 |
| Total | 671 | 100.0 | 44,027 | 100.0 | 17.4 | 100.0 |
| 172: | | | | | | |
| High | 13 | 2.0 | 647 | 1.8 | 11.5 | 55.9 |
| Medium | 142 | 22.0 | 6,782 | 18.9 | 2.6 | 12.8 |
| Low. | 491 | 76.0 | 28,465 | 79.3 | 6.4 | 31.3 |
| Total | 646 | 100.0 | 35,894 | 100.0 | 20.5 | 100.0 |
| 173: | | | | | | |
| High | 8 | 5.7 | 589 | 8.1 | 0.7 | 14.6 |
| Medium | 44 | 31.2 | 2,008 | 27.8 | 2.2 | 46.3 |
| Low. | 89 | 63.1 | 4,639 | 64.1 | 1.9 | 39.1 |
| Total | 141 | 100.0 | 7,236 | 100.0 | 4.8 | 100.0 |
| 180: | | | | | | |
| High | 18 | 4.2 | 3,950 | 24.2 | 53.1 | 92.7 |
| Medium | 124 | 28.7 | 2,865 | 17.5 | 1.1 | 1.9 |
| Low. | 290 | 67.1 | 9,535 | 58.3 | 3.1 | 5.4 |
| Total | 432 | 100.0 | 16,350 | 100.0 | 57.3 | 100.0 |
| 181: | | | | | | |
| High | 8 | 2.1 | 615 | 3.9 | 0.5 | 10.7 |
| Medium | 83 | 21.6 | 4,123 | 26.1 | 2.3 | 48.9 |
| Low. | 293 | 76.3 | 11,054 | 70.0 | 1.9 | 40.4 |
| Total | 384 | 100.0 | 15,792 | 100.0 | 4.7 | 100.0 |
| 182: | | | | | | |
| High | 19 | 7.9 | 13,933 | 78.0 | 45.7 | 97.0 |
| Medium | 41 | 16.9 | 699 | 3.9 | 0.6 | 1.3 |
| Low. | 182 | 75.2 | 3,224 | 18.1 | 0.8 | 1.7 |
| Total | 242 | 100.0 | 17,856 | 100.0 | 47.1 | 100.0 |
| 190: | | | | | | |
| High | 11 | 9.7 | 4,729 | 63.4 | 19.6 | 91.1 |
| Medium | 22 | 19.5 | 246 | 3.3 | 0.1 | 0.5 |
| Low. | 80 | 70.8 | 2,484 | 33.3 | 1.8 | 8.4 |
| Total | 113 | 100.0 | 7,459 | 100.0 | 21.5 | 100.0 |
| 200: | | | | | | |
| Total | 11 | 100.0 | 754 | 100.0 | 3.1 | 100.0 |
| 210: | | | | | | |
| High | 9 | 6.2 | 3,046 | 41.0 | 8.5 | 85.4 |
| Medium | 28 | 19.3 | 154 | 2.1 | 0.1 | 0.8 |
| Low. | 108 | 74.5 | 4,221 | 56.9 | 1.4 | 13.8 |
| Total | 145 | 100.0 | 7,421 | 100.0 | 10.0 | 100.0 |
| 211: | | | | | | |
| Total | 41 | 100.0 | 344 | 100.0 | 0.1 | 100.0 |
| 220: | | | | | | |
| Total | 12 | 100.0 | 879 | 100.0 | 0.7 | 100.0 |

Industrial Activity "Stressor Type" by Watershed, 1973 - Continued

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|----------------------------------|----------------|----------|---------|----------|-----------------------|----------|
| | number | per cent | number | per cent | 1012 B.t.u.'s | per cent |
| 230: | | | | | | |
| High | 6 | 6.8 | 2,387 | 66.3 | x | x |
| Medium | 17 | 19.3 | 207 | 5.7 | 0.1 | 1.3 |
| Low | 65 | 73.9 | 1,008 | 28.0 | x | x |
| Total | 88 | 100.0 | 3,602 | 100.0 | 9.5 | 100.0 |
| 231: | | | | | | |
| High | 17 | 1.6 | 1,435 | 4.1 | 4.1 | 33.4 |
| Medium | 209 | 19.7 | 6,954 | 19.9 | 3.6 | 29.2 |
| Low | 834 | 78.7 | 26,525 | 76.0 | 4.6 | 37.4 |
| Total | 1,060 | 100.0 | 34,914 | 100.0 | 12.3 | 100.0 |
| 232: | | | | | | |
| High | 1 | 1.3 | 29 | 2.8 | x | x |
| Medium | 18 | 23.1 | 326 | 30.8 | 0.3 | 31.4 |
| Low | 59 | 75.6 | 703 | 66.4 | x | x |
| Total | 78 | 100.0 | 1,058 | 100.0 | 1.0 | 100.0 |
| 240: | | | | | | |
| High | 15 | 6.8 | 248 | 9.3 | 0.8 | 44.4 |
| Medium | 60 | 27.3 | 919 | 34.4 | 0.8 | 44.4 |
| Low | 145 | 65.9 | 1,505 | 56.3 | 0.2 | 11.2 |
| Total | 220 | 100.0 | 2,672 | 100.0 | 1.8 | 100.0 |
| 241: | | | | | | |
| High | 10 | 4.4 | 394 | 8.3 | 1.6 | 44.4 |
| Medium | 53 | 23.2 | 2,121 | 44.5 | 1.3 | 36.1 |
| Low | 165 | 72.4 | 2,253 | 47.2 | 0.7 | 19.5 |
| Total | 228 | 100.0 | 4,768 | 100.0 | 3.6 | 100.0 |
| 250: | | | | | | |
| High | 6 | 10.9 | 819 | 59.8 | 5.0 | 90.9 |
| Medium | 13 | 23.6 | 112 | 8.2 | 0.2 | 3.6 |
| Low | 36 | 65.5 | 438 | 32.0 | 0.3 | 5.5 |
| Total | 55 | 100.0 | 1,369 | 100.0 | 5.5 | 100.0 |
| 251: | | | | | | |
| High | 5 | 14.7 | 200 | 31.9 | 3.5 | 93.6 |
| Medium | 7 | 20.6 | 86 | 13.7 | 0.2 | 5.0 |
| Low | 22 | 64.7 | 341 | 54.4 | 0.1 | 1.4 |
| Total | 34 | 100.0 | 627 | 100.0 | 3.7 | 100.0 |
| 252: | | | | | | |
| High | 35 | 4.2 | 2,798 | 14.9 | 41.3 | 77.5 |
| Medium | 185 | 22.5 | 5,735 | 30.4 | 9.4 | 17.6 |
| Low | 604 | 73.3 | 10,306 | 54.7 | 2.6 | 4.9 |
| Total | 824 | 100.0 | 18,839 | 100.0 | 53.3 | 100.0 |
| 253: | | | | | | |
| High | 26 | 5.2 | 525 | 5.1 | 1.4 | 20.6 |
| Medium | 139 | 27.8 | 3,998 | 39.2 | 2.6 | 38.2 |
| Low | 335 | 67.0 | 5,684 | 55.7 | 2.8 | 41.2 |
| Total | 500 | 100.0 | 10,207 | 100.0 | 6.8 | 100.0 |
| 254: | | | | | | |
| High | 17 | 3.0 | 1,194 | 9.7 | 7.9 | 61.5 |
| Medium | 94 | 16.4 | 2,952 | 23.8 | 2.5 | 19.3 |
| Low | 463 | 80.6 | 8,237 | 66.5 | 2.5 | 19.2 |
| Total | 574 | 100.0 | 12,383 | 100.0 | 12.9 | 100.0 |
| 300: | | | | | | |
| High | 1 | 8.3 | 40 | 36.7 | x | x |
| Medium | 2 | 16.7 | 24 | 22.0 | x | x |
| Low | 9 | 75.0 | 45 | 41.3 | -- | 5.3 |
| Total | 12 | 100.0 | 109 | 100.0 | 0.3 | 100.0 |
| 310: | | | | | | |
| Total | 78 | 100.0 | 1,462 | 100.0 | 3.2 | 100.0 |

Industrial Activity "Stressor Type" by Watershed, 1973 - Concluded

| Watershed code and stressor type | Establishments | | Workers | | Purchased fossil fuel | |
|----------------------------------|----------------|----------|---------|----------|-----------------------|----------|
| | number | per cent | number | per cent | 1012 B.t.u.'s | per cent |
| 320: | | | | | | |
| High | 8 | 9.3 | 156 | 6.3 | 0.2 | 10.0 |
| Medium | 11 | 12.8 | 116 | 4.7 | 0.1 | 5.0 |
| Low | 67 | 77.9 | 2,196 | 89.0 | 1.7 | 85.0 |
| Total | 86 | 100.0 | 2,468 | 100.0 | 2.0 | 100.0 |
| 330: | | | | | | |
| Total | x | ... | x | ... | x | ... |
| 400: | | | | | | |
| High | 13 | 7.3 | 3,371 | 38.1 | 7.8 | 84.8 |
| Medium | 14 | 7.8 | 189 | 2.2 | 0.1 | 1.1 |
| Low | 152 | 84.9 | 5,282 | 59.7 | 1.3 | 14.1 |
| Total | 179 | 100.0 | 8,842 | 100.0 | 9.2 | 100.0 |
| 401: | | | | | | |
| High | 8 | 4.2 | 85 | 2.0 | -- | 2.1 |
| Medium | 37 | 19.4 | 894 | 21.1 | 1.0 | 44.2 |
| Low | 146 | 76.4 | 3,266 | 76.9 | 1.2 | 53.7 |
| Total | 191 | 100.0 | 4,245 | 100.0 | 2.2 | 100.0 |
| 402: | | | | | | |
| High | -- | -- | -- | -- | -- | -- |
| Medium | -- | -- | -- | -- | -- | -- |
| Low | 9 | 100.0 | 343 | 100.0 | 0.1 | 100.0 |
| Total | 9 | 100.0 | 343 | 100.0 | 0.1 | 100.0 |
| 410: | | | | | | |
| High | 17 | 7.7 | 1,795 | 17.2 | 11.1 | 72.4 |
| Medium | 23 | 10.4 | 485 | 4.6 | 0.2 | 1.0 |
| Low | 182 | 81.9 | 8,156 | 78.2 | 4.1 | 26.6 |
| Total | 222 | 100.0 | 10,436 | 100.0 | 15.4 | 100.0 |
| 411: | | | | | | |
| High | 9 | 8.4 | 597 | 16.1 | 5.1 | 82.3 |
| Medium | 9 | 8.4 | 57 | 1.5 | -- | 0.3 |
| Low | 89 | 83.2 | 3,052 | 82.4 | 1.1 | 17.3 |
| Total | 107 | 100.0 | 3,706 | 100.0 | 6.2 | 100.0 |
| 412: | | | | | | |
| High | 33 | 1.8 | 2,232 | 4.2 | 5.9 | 36.8 |
| Medium | 298 | 15.9 | 9,862 | 18.8 | 3.9 | 23.9 |
| Low | 1,544 | 82.3 | 40,443 | 77.0 | 6.4 | 39.3 |
| Total | 1,875 | 100.0 | 52,537 | 100.0 | 16.2 | 100.0 |
| 420: | | | | | | |
| Total | 4 | 100.0 | 19 | 100.0 | 0.005 | 100.0 |
| 431: | | | | | | |
| High | 10 | 14.1 | 3,514 | 52.8 | 11.7 | 93.5 |
| Medium | 16 | 22.5 | 1,262 | 18.9 | 0.2 | 1.4 |
| Low | 45 | 63.4 | 1,888 | 28.3 | 0.6 | 5.1 |
| Total | 71 | 100.0 | 6,664 | 100.0 | 12.5 | 100.0 |
| 432: | | | | | | |
| High | 24 | 7.5 | 7,146 | 46.3 | 28.3 | 97.2 |
| Medium | 32 | 10.0 | 393 | 2.6 | 0.2 | 0.8 |
| Low | 264 | 82.5 | 7,885 | 51.1 | 0.6 | 2.0 |
| Total | 320 | 100.0 | 15,424 | 100.0 | 29.1 | 100.0 |
| 433: | | | | | | |
| High | 9 | 3.3 | 1,116 | 14.6 | 5.1 | 91.1 |
| Medium | 40 | 14.6 | 837 | 11.0 | 0.2 | 3.6 |
| Low | 224 | 82.1 | 5,666 | 74.4 | 0.3 | 5.3 |
| Total | 273 | 100.0 | 7,619 | 100.0 | 5.6 | 100.0 |
| 500: | | | | | | |
| Total | x | ... | x | ... | x | ... |

Source: Special tabulation by the Census Field, Statistics Canada.

APPENDIX 7

Major Canadian Rivers (Ordered Alphabetically)

Rivers dammed or modified for hydroelectric,
irrigation or flood control purposes (as of 1975)

Unmodified rivers

| | Watershed code | | Watershed code |
|------------------------------------|-------------------|------------------------|-------------------|
| Abitibi | 210 | Albany | 210 |
| Aguasabon | 190 | Anderson | 330 |
| Ash | 432 | Arctic Red | 300 |
| Assiniboine | 240 | Arnaud | 200 |
| Batiscan | 141 | Athabasca | 310 |
| Betsiamites | 113 | Attawapiskat | 210 |
| Bow | 254 | Back | 330 |
| Bridge | 410 | Battle | 252 |
| Campbell | 432 | Beaver | 210 |
| Canoe | 400 | Berens | 230 |
| Charlot | 300 | Bonnet Plume | 300 |
| Chaudière | 142 | Broadback | 210 |
| Churchill (Manitoba) | 211 | Bulkley | 431 |
| Churchill (Newfoundland) | 100 | Chilcotin | 410 |
| Columbia | 400 | Coppermine | 330 |
| Eastmain | 200 | Coulonge | 151 |
| Elk | 400 | Dease | 300 |
| English | 230 | Dubawnt | 211 |
| Exploits | 101 | Dumoine | 151 |
| French | 182 | Eagle | 100 |
| Gaspereau | 150 | Ekwan | 210 |
| Gatineau | 120 | Finlay | 320 |
| Grand | 170 | Fond du Lac | 300 |
| La Grande | 200 | Fort Nelson | 300 |
| Humber | 111 | Fraser | 410 |
| Kaministiquia | 190 | Gander | 101 |
| Kananaskis | 254 | George | 200 |
| Kapuskasing | 210 | Gods | 210 |
| Kootenay | 400 | Great Whale | 200 |
| Lièvre | 150 | Harricanaw | 210 |
| Madawaska | 151 | Hay | 300 |
| Magpie | 110 | Hayes | 210 |
| Manicouagan | 110 | Homathko | 432 |
| Mattagami | 210 | Horton | 330 |
| Mersey | 104 | Kanairiktok | 100 |
| Michipicoten | 190 | Kazan | 211 |
| Mississagi | 182 | Kettle | 400 |
| Mississippi | 151 | Kogaluc | 200 |
| Montreal | 190 | Koksoak | 200 |
| Nechako | 410 | Leaf | 200 |
| Nelson | 220 | Liard | 300 |
| Nepisiguit | 113 | Lillooet | 410 |
| Nipigon | 190 | Little Whale | 200 |
| Ottawa | 150 and 151 | Mackenzie | 300 |
| Outardes | 110 | McKeand | 330 |
| Peace | 320 | Macmillan | 420 |
| Péribonca | 140 | Miramichi | 113 |
| Powell | 432 | Missinaibi | 210 |
| Puntledge | 432 | Mistassini | 210 |

Major Canadian Rivers – Concluded
(Ordered Alphabetically)

| Rivers dammed or modified for hydroelectric, irrigation or flood control purposes (as of 1975) | | Unmodified rivers | |
|---|-------------------|--------------------------|-------------------|
| | Watershed code | | Watershed code |
| Qu'Appelle | 241 | Moisie | 110 |
| Rainy | 230 | Naskaupi | 100 |
| Red | 231 | Nastapoka | 200 |
| Richelieu | 144 | Nass | 431 |
| Rideau | 150 | Natashquan | 110 |
| Rouge | 150 | Nottaway | 210 |
| Sables | 140 | Oldman | 253 |
| Saguenay | 140 | Parsnip | 320 |
| Saint John | 130 | Peel | 300 |
| St. Croix | 121 | Pelly | 420 |
| St-François | 144 | Petit-Mécatina | 110 |
| St. Lawrence | 140 - 147 | Petitot | 300 |
| St. Maurice | 143 | Poplar | 230 |
| Ste. Anne | 141 | Porcupine | 420 |
| Ste. Anne du Nord | 141 | Povungnituk | 200 |
| Ste. Marguerite | 110 | Quesnel | 410 |
| Salmon | 111 | Red Deer | 253 |
| Saskatchewan | 250 - 254 | Romaine | 110 |
| Seine | 230 | Rupert | 210 |
| Shuswap | 411 | St. Augustin | 110 |
| Snare | 300 | Seal | 211 |
| Souris | 240 | Severn | 210 |
| South Saskatchewan | 253 | Similkameen | 402 |
| Spanish | 182 | Skeena | 431 |
| Spray | 254 | Slave | 300 |
| Stave | 412 | Smoky | 320 |
| Sturgeon | 182 | South Nahanni | 300 |
| Taltson | 300 | South Thompson | 411 |
| Thames | 172 | Squamish | 412 |
| Tobique | 130 | Stewart | 420 |
| Trent | 161 | Stikine | 431 |
| Wanapitei | 182 | Stuart | 410 |
| Winnipeg | 230 | Taku | 431 |
| Yellowknife | 300 | Teslin | 420 |
| Yukon | 420 | Thelon | 211 |
| | | Thlewiaza | 211 |
| | | Thompson | 411 |
| | | Wabasca | 320 |
| | | West Road | 410 |
| | | Whale | 200 |
| | | Winisk | 210 |

APPENDIX 8

Regional User Advisory Services

Central Inquiries Service,

Statistics Canada,
Ottawa, Ont.
K1A 0T6
(613-992-2959;
992-4734)

St. John's

Statistics Canada,
3rd Floor, Viking Building,
Crosbie Road,
P.O. Box 8556,
St. John's, Nfld.
A1B 3P2
(709-726-0713)

Halifax

Statistics Canada,
1256 Barrington Street,
Halifax, N.S.
B3J 1Y6
(902-426-5331)

Montréal

Statistics Canada,
Alexis Nihon Plaza,
1500 Atwater Avenue,
Montréal, Que.
H3Z 1Y2
(514-283-5725)

Toronto

Statistics Canada,
25 St. Clair Avenue East,
Toronto, Ont.
M4T 1M4
(416-966-6586)

Winnipeg

Statistics Canada,
Room 500, General Post Office,
266 Graham Avenue,
Winnipeg, Man.
R3C 0K4
(204-985-4020)

Regina

Statistics Canada,
530 Midtown Centre,
Regina, Sask.
S4P 2B6
(306-569-5405)

Edmonton

Statistics Canada,
10th Floor, Baker Centre Building,
10025-106th Street,
Edmonton, Alta.
T5J 1G9
(403-425-5052)

Vancouver

Statistics Canada,
16 East Hastings Street,
Vancouver, B.C.
V6A 1N1
(604-666-3695)

Toll-free access to the regional statistical information service is provided in Charlottetown, Moncton, Saint John and Sydney by calling the operator and asking for ZENITH 22066. Throughout Saskatchewan, the

Regina office can be reached by dialing 1-800-667-3524 and throughout Alberta, the Edmonton office can be reached by dialing 1-800-222-6400.

APPENDIX 9

Full Depository Libraries

Canada

Library,
Memorial University,
St. John's, Nfld.

Planning Library,
Provincial Administrative Bldg.,
Charlottetown, P.E.I.

Library,
Acadia University,
Wolfville, N.S.

Dalhousie University Library,
Studley Campus,
Halifax, N.S.

University of New Brunswick,
Harriet Irving Library,
Fredericton, N.B.

Bibliothèque,
Université de Moncton,
Moncton, N.B.

Ralph Pickard Bell Library,
Mount Allison University,
Sackville, N.B.

Bibliothèque municipale,
Rue Sherbrooke est,
Montréal, Qué.

McGill University Library,
3459 McTavish St.,
Montréal, Que.

Centrale des bibliothèques,
Ministère de l'Éducation du Québec,
1685 est, rue Fleury,
Montréal, Qué.

Serials Library,
Concordia University,
1435 Drummond St.,
Montréal, Que.

Université de Montréal,
Bibliothèque Sciences Humaines
et Sociales,
Montréal, Qué.

Bibliothèque de l'Université Laval,
Cité Universitaire,
Ste-Foy, Qué.

Université de Sherbrooke,
Bibliothèque générale,
Cité Universitaire,
Sherbrooke, Qué.

Brampton Public Library,
Chinguacousy Branch Library
and Art Gallery,
150 Central Park Drive,
Bramalea, Ont.

Documents Services,
York University Libraries,
4700 Keele St.,
Downsview, Ont.

Library,
Documentation Centre,
University of Guelph,
Guelph, Ont.

Hamilton Public Library,
Hamilton, Ont.

Documents Dept.,
Mills Memorial Library,
McMaster University,
Hamilton, Ont.

Douglas Library,
Queen's University,
Kingston, Ont.

Library,
University of Western Ontario,
London, Ont.

Laurentian University,
Library,
Sudbury, Ont.

National Library of Canada,
Government Documents,
Ottawa, Ont.

University of Ottawa,
Central Library,
165 Waller St.,
Ottawa, Ont.

Full Depository Libraries — Continued

Canada — Concluded

Metropolitan Toronto,
Central Library,
214 College St.,
Toronto, Ont.

University of Toronto Library,
Serials Dept.,
Toronto, Ont.

Lakehead University Library,
Thunder Bay, Ont.

Public Library,
216 S Brodie St.,
Thunder Bay, Ont.

Windsor Public Library,
850 Ouellette Ave.,
Windsor, Ont.

Elizabeth Dafoe Library,
University of Manitoba,
Winnipeg, Man.

University of Saskatchewan Library,
Saskatoon, Sask.

University Library,
University of Calgary,
Calgary, Alberta.

Simon Fraser University Library,
Burnaby, B.C.

University of British Columbia
Library,
Vancouver, B.C.

Vancouver Public Library,
750 Burrard St.,
Vancouver, B.C.

University of Victoria,
McPherson Library,
Victoria, B.C.

United States

New York State Library,
Albany, N.Y.

Canadian Consulate General,
1251 Avenue of the Americas,
New York, N.Y.

New York Public Library,
New York, N.Y.

Library of Congress,
Washington, D.C.

Office of Information,
Canadian Embassy,
1771 N St., N.W.,
Washington, D.C.

Overseas

National Library of Australia,
Canberra, Australia.

Bibliothèque Royale Albert 1er,
80-84, rue des Tanneurs,
Bruxelles, Belgique.

British Museum,
Department of Printed Books,
London W.C. 1, England.

The Office of the High
Commissioner for Canada,
Canada House, Trafalgar Square,
London S.W. 1, England.

Ambassade du Canada,
Centre culturel canadien,
Bibliothèque,
5, rue de Constantine,
75 Paris 7, France.

Staatsbibliothek Preussischer
Kulturbesitz Abteilung
Amtsdruckschriften und Tausch
1 Berlin 30,
Federal Republic of Germany.

National Diet Library,
Tokyo, Japan.

Note: Legislative Libraries are also Full Depositories.

Full Depository Libraries — Concluded

The following public libraries receive copies of all Statistics Canada publications and are available for reference purposes.

Newfoundland Public Library,
Allandale Road,
St. John's, Nfld.

Halifax City Regional Library,
5381 Spring Garden Road,
Halifax, N.S.

Saint John Regional Library,
20 Hazen Ave.,
Saint John, N.B.

Ottawa Public Library,
120 Metcalfe St.,
Ottawa, Ont.

Mississauga Public Library,
110 Dundas St.,
Cooksville, Ont.

Etobicoke Public Library,
1806 Islington Ave.,
Etobicoke, Ont.

Birchmount District Library,
1076 Ellesmere Rd.,
Scarborough, Ont.

St. Catharines Public Library,
59 Church St.,
St. Catharines, Ont.

Toronto Public Library,
40 Orchard View Blvd.,
Toronto, Ont.

North York Public Library,
5126 Yonge St.,
Willowdale, Ont.

Winnipeg Public Library,
380 William Ave.,
Winnipeg, Man.

Regina Public Library,
2311-12th Ave.,
Regina, Sask.

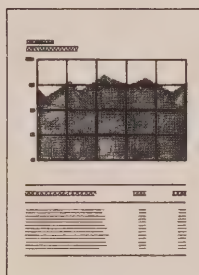
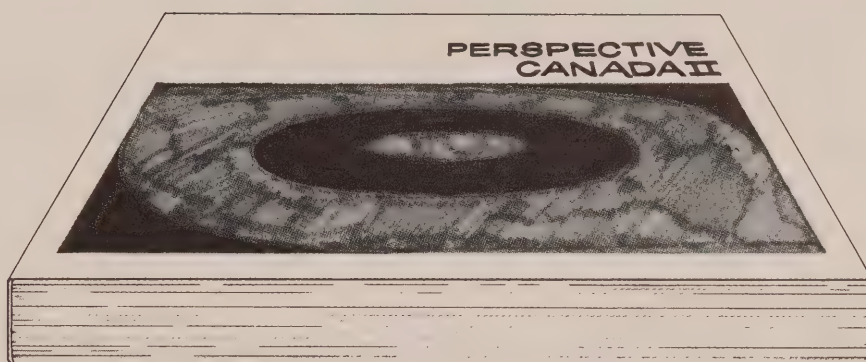
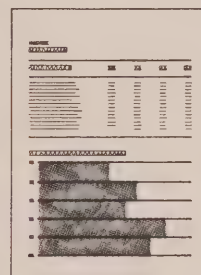
Calgary Public Library,
616 MacLeod Trail S.E.,
Calgary, Alta.

Edmonton Public Library,
Sir Winston Churchill Square,
Edmonton, Alberta.

Whalley Public Library,
10667-135A St.,
Surrey, B.C.

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